THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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CLEVELAND, O., APRIL 18, 1889.

THE WEEK IN IRON CIRCLES.

General Features.

The statement of the condition of blast furnaces in the United States on April 1st, printed elsewhere in this issue, shows that the weekly production of coke irons at the present time has never been exceeded, and, correspondingly, the stocks on hand are the largest ever known in this country. The few encouraging features are: The favorable crop outlook in the West; the starting up of several large iron works at Pittsburgh to fill orders on their books, and the activity among pipe manufacturers, orders for some 15,000 to 18,000 tons being placed recently in Western Pennsylvania. Consumption througout the Central West continues nearly, if not quite, up to the usual standard. At Cincinnati the general tone of the market continues dull; nevertheless, the aggregate of current business is larger than is generally supposed. It is believed that so far this year Cincinnati is distributing 30 per cent. more pig iron than during the corresponding months of last year. The tendency seems to be towards a steady increase. Values have not recovered, but are fully holding their own. Prices are so low that manufacturers, both North and South, complain seriously and are disposed to blow out furnaces liberally, unless signs of improvement appear soon. Four or five of the largest Southern furnaces have gone out of blast for repairs and in most cases no effort will be made to start again until prices are better. There has been no furthur decline in values at Chicago; and, while market conditions cannot be said to be in any respect improved, prices remain firm on the low range of the past thirty days. Little or no Southern iron is being offered, the field being practically resigned to the local furnaces which are able to name lower prices. Consumers of Lake Superior charcoal iron are watching the reported short wood supply among the furnaces in Michigan and Wisconsin, and if a material reduction in output seems likely, it is probable that prices will harden. The charcoal iron market at Detroit is quite active, and the volume of business is about the average for this season of the year. Several large sales of Lake Superior charcoal have been made, and in most cases prices have been sustained. Our correspondent is of the opinion that should the demand continue as active for any length of time as it is at present, prices will undoubtedly be advanced. Numerous small orders for coke iron have been received, and stocks in the hands of small users are very light. In several instances sellers have refused offers a little under figures asked, and it looks as if prices were likely to range higher instead of lower. Our Louisville correspondent reports the market in a peculiar condition. It is thought a decided change, either for better or worse, must take place soon. At present prices, furnaces cannot continue to make iron, and they claim that unless a change takes place, it will be wise for them to blow out. The sales during the past week show no improvement, and some offerings show a tendency to further decline. There has not been very much iron placed during the week, buyers having bought all they desire. Coke remains stagnant. About 180 ovens went out last week. Locomotive builders report a scarcity of demand. While we can turn out 3,000 engines annually, the railroads at present are buying only about 1,000. English and Continental markets are strong.

Iron Ore.

During the past week furnace men have displayed a great deal of activity in the way of purchasing their ore supplies, and as a result of this activity, the ore men report a lively trade. The Florence mine is reported to be sold up to the extent of 160,000 tons, including all qualities, and at prices varying from $2.00 at the mine to $3.75 at Cleveland—a price which leads to the belief that this ore was sold rather too hastily, as it is worth at least twenty-five cents more. The bewildering multiplicity of ores that have made their appearance of late on the Vermilion range, or at least the assay book of the Minnesota Iron Co., seems to indicate that its ore product is divided into a great many kinds. At least it is found that a great many similar Minnesota ores are being sold under various names and at different prices, to suit the market and to meet the varying demands. The last sale of a fancy brand of red specular ore is that of 5,000 tons of Lake Angeline and the Lake Superior Iron Company's section 16, at $6.35, delivered in Buffalo. This ore, of course, plays no role in the market, as its total quantity will hardly exceed 50,000 tons. Quotations are firmly established at $5.75 for Republic, Champion and Minnesota, $5.50 for Pence and Hennepin, $5.25 for Ashland, Iron King and Aurora, $5.00 for the Republic Reduction Company's Chippewa ore and the second quality of Chapin, and $4.00 for Commonwealth and Dunn. The past few days have seen sales of Dunn ore, aggregating more than 100,000 tons, and the character of the sales, with the quantity reported as disposed of, seems to indicate a strong position on the part of furnace men manufacturing merchant iron, both foundry and mill, while the call for non-Bessemer ores is not nearly as strong. It is safe to assume that nearly all the non-Bessemer ore will be fully gone before the establishment of a lively trade in ores low in phosphorus and correspondingly high in price, another argument confirming the lack of rail orders. Nothing much is doing in lake freights. Ninety cents is the rate paid for single Escanaba charters, but owing to delay in opening of navigation, little is heard of charters from Ashland and Marquette.

Pig Iron.

The market is characterized by continued apathy on the part of consumers, who buy only as actual and imperative needs demand, and then only in the smallest quantity. The outlook is good enough, but the furnace men agree that they cannot live on outlook alone, and without corresponding prices. For three months past they have anxiously awaited a turn in their favor, but, excepting one short spurt, nothing has gone their way and they are a despondent lot. A prime quality of foundry iron can be bought at $16.50, four months, while mill iron commands about $2 less. Southern iron continues to depress the local market wherever it enters into competition with Ohio iron made from Lake Superior ores, and there is no telling what the result will be. The production of pig metal has been cut down in many quarters to the lowest possible quantity—barely enough to keep in business; but unless a change for the better is noted at an early day, some of the largest and best known stacks will certainly go out of blast.

Merchant Iron.

According to all reports the demand for bar iron has improved to an appreciable extent, and while no change is noted as to price, more iron has been sold of late than could well be expected under the depressing conditions that affect the market. Sheets, too, have similarly improved and are not as plentiful as was the case a short time ago. The market, however, will not be very active until sometime in July. Building shapes are firm at combination prices.

Scrap Iron.

No sales are reported either in wheels, miscellaneous scrap, turnings or axles. There is quite a wide margin between the rail prices asked by dealers and those conceded by mill men. There seems to be an abundance of scrap of all kinds with but little demand.

Hardware.

The business is still booming in all its branches and no complaint of any kind is made by jobbers or retailers. Metals are weak and dull. Spring goods and light shelf ware are going at a rapid rate.

IRON AND STEEL IN THE UNITED STATES IN 1888.

The Annual Report of the American Iron and Steel Association, always so eagerly awaited by the trade, is at hand, a month ahead of time, thanks to the promptness and painstaking care of General Manager James M. Swank. Compressed into a simple table, the eighty pages of statistics and comment give the following results:

	1887.	1888.
Production of Pig Iron, net tons	7,187,206	7,268,507
Production of Spiegeleisen, included in Pig Iron, net tons	47,598	54,769
Production of Bar, Rod, Hoop, Skelp and Shaped Iron, net tons	1,917,403	1,819,585
Production of Plate and Sheet Iron, except Nail Plate, net tons	477,056	469,312
Production of Bar, Rod, Hoop, Skelp and Shaped Steel, net tons	528,989	772,017
Production of Plate and Sheet Steel, except Nail Plate, net tons	198,702	213,694
Production of Cut Nails and Spikes, kegs of 100 pounds	6,908,870	6,493,591
Production of all Rolled Iron, including Iron Nails and excluding Rails, net tons	2,565,438	2,397,402
Production of all Rolled Steel, including Steel Nails and excluding Rails, net tons	902,156	1,201,885
Production of Bessemer Steel Rails, net tons	2,354,132	1,552,631
Production of Open-hearth Steel Rails, net tons	19,203	5,261
Production of Iron Rails, net tons	23,062	14,252
Total production of Rails, net tons	2,396,397	1,572,144
Production of Street Rails, included above, net tons	57,362	50,345
Production of Bessemer Steel Ingots, net tons	3,288,357	2,812,500
Production of Open-hearth Steel Ingots, net tons	360,717	352,036
Production of Crucible Steel Ingots, net tons	84,421	78,713
Production of Blister and "Patented" Steel, net tons	6,265	4,124
Production of all kinds of Steel, net tons	3,739,760	3,247,373
Production of Iron Blooms, net tons	43,306	39,875
Value of Imports of Iron and Steel	$56,420 607	$42,308,256
Value of Exports of Iron and Steel	$16,235,922	$19,578,489
Imports of Iron Ore, gross tons	1,194,301	587,470
Domestic production of Iron Ore, gross tons	11,300,000	12,062,530
Production of Anthracite Coal, gross tons	35,273,442	38,909,000
Total Domestic Production of Coal, gross tons	110,727,906	123,674,771
Iron and Steel Ships built in the fiscal year ended June 30	29	43
Miles of New Railroad completed	13,080	7,106
Total number of miles of Railroad, December 31	151,066	158,172
Immigrants in the calendar year ended December 31	516,933	525,019

The marked disparity between the production of pig iron and of other forms of iron and steel will be at once evident. While the latter exhibits a decided falling off, the former shows an increase, and reached the highest total ever attained by the pig iron industry of the United States. The explanation, as given by Mr. Swank, is very simple and plausible. It is found in a variety of concurrent influences. Undoubtedly most importance should be attached to the fact, that we have an immense population, which must be supplied with all kinds of machinery, and with stoves, ranges and heaters, domestic utensils, wagons and carriages, plows and other agricultural implements, mechanics' and laborers' tools, cast and wrought iron water and gas pipe, bridges for country roads, and many other articles, all of which require iron and steel. Next to this primary demand for pig iron, stress should be placed upon the large consumption of pig iron which is annually required in the manufacture of locomotives, passenger and freight cars, and iron and steel bridges for our enormous railroad mileage—a far greater mileage than all Europe can now boast. Next in importance is the increasing demand of the last few years for pig iron to be used in the production of iron and steel for various structural purposes, and in the production of steel wire rods to be used in the manufacture of wire fencing. Lastly may be mentioned the increased demand in recent years for pig iron due to the construction of new iron and steel works, particularly in the Southern States.

As a whole, the year 1888 was not very satisfactory to the trade, as to either output or prices.

WHY AMERICAN SHIP-BUILDING WANES.

We presume there have been more absurd and exaggerated conclusions concerning American affairs, from the early days of Charles Dickens to the present time, but we do not recall a greater perversion of facts put in a more plausible way than the recent attempt of the *Iron and Coal Trades Review*, of London, to account for the decay of ship-building in the United States. The major premise of the *Review's* remarkable conclusions is a passage from a recent report to his home government by the British vice-consul at Newport News, in which he says that "at no distant date the growing national discontent at the almost total loss of the foreign carrying trade will accelerate and bring to a successful issue the movement now on foot to legalize the purchase and use under the United States flag of foreign-built ships." If that is a sample of the information that the British vice-consul regularly imparts to the Foreign Office, we do not wonder that otherwise intelligent journals like the *Iron and Coal Trades Review* are led astray into most illogical conclusions. It seems scarcely necessary to say that any such movement as that suggested exists only in the brilliant imagination of the British vice-consul, and hence that the complacent hope of our English contemporary, that the legislation in the line proposed might be carried through, because it "would undoubtedly strike a severe blow at the already languishing iron ship-building industry of the United States," is as futile as it is fanciful. It won't be done.

Equally absurd and illogical is the *Review's* assertion that "it is Protection, and nothing else, which has prevented the American ship-building industry from moving with the times, and the ship-builders are sacrificed for the benefit of the iron and steel manufacturers." The *Review*, of course, refers to the exclusion of British plates from our markets by reason of the present tariff. This assertion has been iterated and reiterated, and as often answered; but still it bobs up serenely as of yore. Perhaps, however, it may still do some good to put alongside it the simple statement of one who, while a ship-builder of world-wide repute, was also a consistent Protectionist.

In a letter to the editor of the IRON TRADE REVIEW, dated January 5th, 1886, John Roach put the whole problem in clear and unmistakable light as follows: "The difference in the first cost of a "ship on the Delaware and on the Clyde never would prevent us from "competing with other countries. A ship on the water is very much "like a factory on the land. You may give a man a factory, but if "you compel him to pay 40 per cent. more for his labor than another "who pays a good price for his factory, how long do you suppose it "will be before the man who gets his factory free will be compelled "to close it? One man pays, perhaps, 5 or 6 per cent. on the capital "invested in his buildings, while the other pays 40 per cent. more "for his labor. Or, suppose one man builds his factory at a cost of, "say, 20 per cent. more than his neighbor, but both pay the same "price for labor in running, and the interest on the capital the same; "the man whose factory cost him more would certainly not close it "because the first cost was greater. So I conclude that the difference "in the first cost of our ships is not the reason why we do not build "for the foreign trade. Your own judgment will no doubt draw similar conclusions. The increased cost of running ships (more than "double that of foreign countries) and the lack of encouragement "from our government are the main causes for our not owning and "running ships in the foreign trade. While England, as a great maritime nation, has a policy which holds out inducements to capitalists, we have none."

We do not see how any comment of ours could add a particle of light to the above, and we accordingly commend it as it stands to our no doubt sincere, but much mistaken, contemporary.

THE AMERICAN IRON TRADE IN A NUTSHELL.

We *consumed* less pig iron in 1888 than in 1887 in the United States, though we *produced more*. The explanation is found in the fact that we imported less by 58 per cent. than in 1887.

Our production of steel rails in 1888 fell 34 per cent. below that of the previous year. In fact, the shrinkage in output was greater than the total production of steel rails in 1879.

Our importations of steel rails last year declined 54 per cent., contributing to a total decrease in *consumption* of 35 per cent.

The Southern States made more pig iron in 1888 than was made in the entire country prior to 1865.

Ohio made more pig iron in 1888 than in 1887, and Pennsylvania made less.

The production of iron ore in the United States in 1888 was the largest in our history, amounting to about 12,050,000 gross tons, as against a production in 1887 of about 11,300,000 tons. Our imports fell off about 50 per cent.

Pennsylvania produced 49.3 per cent. of the total output of pig iron in 1888; Ohio, 15.2 per cent.; Illinois, 8 per cent., and Alabama, 6.2 per cent. Every other State fell below 4 per cent.

Our consumption of iron and steel in each of the years 1887 and 1888 exceeded 8,000,000 gross tons, but it was larger in 1887 than in 1888.

The *per capita* consumption of iron and steel in the United States is greater than in any other country. In 1887 it was 300 pounds *per capita;* in 1888, probably 285 pounds.

For several years past we have consumed more iron and steel than any of the great European countries. No country in the world uses railroads, heaters, ranges, stoves, wire fencing, sheet iron and tin-plate roofing, agricultural machinery, etc., so largely as do we.

Pennsylvania made over 56 per cent. of all the steel ingots produced in 1888, against 53 per cent. in 1887. Illinois made 22 per cent. in 1888, against 26 per cent in 1887.

Pennsylvania still leads in the production of Bessemer steel rails, of course, having made 59 per cent. in 1888, against 53 per cent. in 1887; but in 1886 she stood 63 per cent., and in 1885, 68 per cent. Illinois advanced from 25 per cent. in 1887 to 32 per cent. in 1888.

CUBA AS A COMPETITOR.

While it is yet too early to predict the probable influence upon the Lake Superior iron ore interests of the introduction of Cuban ores upon the general market, it may not be out of place to draw attention to a few facts concerning the new competitor that are not generally known or appreciated. The Cuban iron range, it appears from the careful statements of Mr. Thomas Haskins Graham, of Phil-

adelphia, is about fourteen miles long, and lies only four miles from the Caribbean Sea. The ore as thus far shipped yields from 62 to 66 per cent. of metallic iron; 0.006 to 0.026 per cent. of phosphorus, and .02 to .04 per cent. of sulphur. The outcrops vary from 150 to 450 feet in width, and are composed almost entirely of ore. So much for the extent and richness of the deposit. Can these ores be imported to a sufficient amount, after paying the import duty, to seriously compete with Lake Superior ores? Let Mr. Graham answer:

Ocean freights from New York or Norfolk range from $1.00 to $1.75. Labor costs 80 cents per day. It is claimed that Cuban iron ore can be placed in Pittsburgh, duty and all charges paid, at from $1.00 to $1.25 less than the current rates for Lake Superior ores. Whether this claim has any basis in fact we leave to our readers to judge after reading the following estimate of Mr. Graham as to the cost of a ton of ore, duty paid, at New York, Philadelphia and Baltimore:

Mining	$ .75	United States duty	.75
Royalty	.30	Administration and incidentals	.50
Transportation	.15		
Ocean freights	1.75	Total	$4.20

The present cost of Lake Superior Bessemer ore in Pittsburgh is about $6.75, and in the Schuylkill Valley it is from $7.25 to $8.25 per ton.

The duty of Lake Superior ore men is evident and immediate. No stone should be left unturned to secure a reduction of rail freights from Lake Erie ports to Eastern consuming points. It must eventually come to this, and the sooner the railroads realize it the better.

IN strong confirmation of the IRON TRADE REVIEW'S recent remarks on the evils of "Booms and Bonuses," is the statement made at the recent meeting of the Ohio Gas Association by Mr. Eugene Printz, Superintendent of the Gaslight Company, of Zanesville, that he had found that most of the manufactories that have moved from towns where they formerly used coal, for the purpose of using natural gas, were manufactories that were run down, and had but very little business in their own towns. They were almost bankrupt, and they would take advantage of offers of land and buildings and a certain amount of money to locate in certain towns, and in many cases they have lasted but a little while after they moved to new towns. That's about the size of it.

WE cannot forbear reproducing this characteristic letter to the editor from Mr. Jacob Reese, the well known metallurgical engineer, and inventor of the Basic Dephosphorizing Process, and the Tetra-Basic Phosphate: "I congratulate your patrons on the great improvement in the IRON TRADE REVIEW. The old style looks like a country store, while the new is like an eight-story building with a first-class elevator. I think that the man who made this departure was born while the sun was shining. The departure was needed as the years go by; for in the development of science and the arts we look for better things all around, and in this you deserve thanks and a greater measure of success, for you have done well."

THE family of TRADE REVIEWS is a large, respectable and growing one, as we learn from an advance copy of a Directory of Scientific and Trade Journals, just going through the press. First comes THE IRON TRADE REVIEW, born away back in the '60s. Then there are: The *Australasian Trade Review*, Sydney, New South Wales; the *German Trade Review*, Berlin, Germany; the *Canadian Trade Review*, Montreal, Canada; the *Furniture Trade Review*, New York; the *New Jersey Trade Review*, Newark, N. J.; the *Millinery Trade Review*, New York; the *Indiana Trade Review*, Indianapolis; the *Music Trade Review*, New York, and plain *Trade Reviews* at Waco, Texas; Forth Worth, Texas, and Sedalia, Mo.

MESSRS. Warren, Wood & Co., of New York, large dealers in pig iron, come to the rescue of Southern iron, through the *Manufacturers' Record*, with the statement that some of the Southern brands are fully as good as the best Scotch and Swedish makes; and they quote the remark of one of the officers of the largest producers of Scotch iron, who recently visited the South, that a certain Alabama brand (naming it) was superior to any made in this country, and the time was not far distant when foreign iron would cease to come to this market.

The amount of capital stock represented in new enterprises projected in the South during the first three months of 1889, according to the *Manufacturers' Record*, is $58,227,000, as against $38,668,000 for the corresponding period of 1888. The new projects include 19 blast furnaces, 41 machine shops and foundries, and 12 miscellaneous iron works, rolling mills, pipe works, etc. The growth of that section has certainly been phenomenal, and the most phenomenal thing about it is the way it keeps up.

THE IRON TRADE REVIEW takes no part in politics, but it would like to see Mr. Joseph D. Weeks, of Pittsburgh, appointed Superintendent of the next census. No more deserving appointment could be made.

RECENT "BIG THINGS" IN MACHINERY.

Heavy Foundry Work.

The Southwark Foundry & Machine Co., at Philadelphia, Pa., are turning out this year some very heavy work. They have just finished four immense duplex blowing engines for the new works of the Pennsylvania Steel Co., near Baltimore, Md. Each engine weighs 755,000 pounds, and under each are two bed-plates weighing 63,000 pounds apiece. These were cast in one piece. The fly-wheel, weighing 100,000 pounds, was also cast whole and split afterwards. It is believed that these are the largest blowing machines in the country.—[American Manufacturer.

Large Shipment of Agricultural Machinery.

A Massillon, O., dispatch says: The largest single shipment of agricultural machinery on record was that made on Monday, the 8th inst., from the extensive works of Russell & Co., in this city, to their branch office at Portland, Ore. It will consist of forty-six separators, thirty-two portable engines, and twenty-four horse powers, and will be transported on a train composed of twenty-seven cars. On each car is painted in large letters, "Russell & Co., Portland, Ore.," and the train will be run through to its destination on the special schedule. The aggregate value of the property is $80,000, and the freight charges will be almost $9,000.

A Big Press.

The Stiles & Parker Press Co., of Middleton, Ct., is building a press at its shops that is worthy of note. It is for a firm in Milwaukee, Wis., and it is to be used in the manufacture of tinware and other metal ware. This press is one of the Stiles latest improvements, and is a toggle joint press. Its dimensions are: Height to top of frame, sixteen feet three inches; to top of gears, seventeen feet four inches; diameter of gears, seven feet 1½ inches. Weight of crank shaft, 3,100 pounds; weight of gears, 6,100 pounds; weight of press completed, thirty-seven tons. It is said to be the largest drop press ever built.

Largest Order for Steam Power in Canada.

The Polson Iron Works Co., of Toronto, have just secured the largest single order for steam power placed in Canada. The Royal Electric Co., of Montreal, having entered into a large contract for lighting the streets of that city, are greatly enlarging their plant, and, to furnish the requisite power, have ordered six large Brown automatic engines. Their order consists of four engines, with cylinders 16 inches diameter by 42 inches stroke, and two engines having cylinders 18 inches diameter by 42 inches stroke—aggregating 1,100-horse power, which, added to the present engine power, will amount to nearly 2,000-horse power in this one establishment, furnished by "Brown" engines. The Royal Electric Co., having used the "Brown" in competition with other styles of engine, and found it so satisfactory, now select that engine in preference to all others, and in this way give the best possible evidence that they consider it the most economical, most reliable and perfect-working engine in the market. That a Montreal concern should come to Toronto for engines is a tribute to the enterprise of our Western manufacturers, and especially to the Polson Iron Works Co., and the placing of the order with them is a guarantee that it will be filled in a style that will be creditable to themselves and to Toronto.—[Canadian Manufacturer.

Ship-owning at Cleveland.

The Cleveland *Plain Dealer* prints a table showing the increase of Cleveland's fleet for the last 10 years. In 1879, 184 boats were owned here with a gross tonnage of 62,437 tons; now 242 boats measuring 164,645 gross tons are documented from this port. Of these 110 depend on sails, 116 are wooden and nine iron steamers; the remaining seven are barges and yachts. Ten years ago 128 sail and 56 small steamboats were owned here. Cleveland has long been one of the principal shipbuilding ports on the lakes, its receipts for the past few years ranging from $2,000,000 to $3,500,000 from that industry, and they have apparently put a large portion of this money into vessels, as the value of their fleet at present is said to be very near $10,000,000.

A Good One on W. K. Vanderbilt.

A pretty good story is told of engineer Simpson, one of the veterans of the Maine Central service. Last Summer when William K. Vanderbilt's car was at Mount Desert ferry, the general manager of the Maine Central sent a locomotive down there to take the car to Portland, whither the millionaire desired to go. Simpson was the engineer, and he pulled the car along to Portland at a surprising rate of speed. At Brunswick a stop was made for water, and while there Mr. Vanderbilt got out and requested the old engineer not to drive so fast. Simpson eyed the nabob a quarter of a minute, and then replied: "I am running this train under orders from Payson Tucker to be in Portland at 1:07. If you want to stop here, all right; if you want to go to Portland, get in." Mr. Vanderbilt got in.—[New York Sun.

MILWAUKEE has a drawbridge that is worked by electricity, said to be the first one built. It is 300 feet long, and is turned by a 10-horse power motor.

CONDITION OF THE BLAST FURNACES OF THE UNITED STATES.

April 1, 1889.

[CONDENSED FROM THE AMERICAN MANUFACTURER.]

LOCATION OF FURNACES.	CHARCOAL.					BITUMINOUS OR COKE.				
	Total No. of Stacks.	In Blast.		Out of Bl'st.		Total No. of Stacks.	In Blast.		Out of Bl'st.	
		No.	Week'y capac-ity.	No.	Week'y capac-ity.		No.	Week'y capac-ity.	No.	Week'y capac-ity.
New England	14	7	650	7	522					
New York	10	3	348	7	847	3	1	1,080	2	2,000
Pennsylvania	21	5	390	16	855					
Upper Susquehanna Valley						1	0	0	1	200
Pittsburgh						19	17	20,354	2	1,450
Spiegel						1	1	450	0	0
Allegheny Valley						2	1	597	1	125
Shenango Valley						22	16	11,608	6	3,076
Youghiogheny Valley						5	4	1,463	1	525
Juniata and Conemaugh Valley						22	13	6,322	9	2,965
Spiegel						1	0	0	1	250
Maryland	11	4	395	7	550	1	0	0	1	140
Virginia	22	1	40	21	1,110	12	10	3,863	2	1,758
North Carolina	2	1	153	1	240					
West Virginia	3	0	0	3	190	6	4	2,748	2	580
Ohio—Mahoning Valley						15	11	10,087	4	900
Eastern, Central and Northern						18	12	7,432	6	4,842
Hocking Valley						15	7	1,994	8	1,892
Hanging Rock	15	7	651	8	718	13	9	2,694	4	650
Miscellaneous	1	1	200	0	0	18	12	7,432	6	4,842
Kentucky						4	3	971	1	350
Hanging Rock	2	2	240	0	0					
Western Region and Miscellan'ous.	2	0	0	2	154					
Tennessee	8	2	734	6	757	10	9	4,458	1	400
Georgia	2	1	52	1	98	2	0	0	2	1,175
Alabama	10	9	1,628	1	300	22	16	9,523	6	2,541
Indiana						2	2	383	0	0
Illinois						16	8	9,790	8	6,720
Michigan	26	11	3,571	15	4,361	1	0	0	1	300
Wisconsin	8	4	1,801	4	489	4	2	1,308	2	882
Minnesota	1	0	0	1	140					
Missouri	3	2	677	1	240	8	2	1,230	6	3,355
Texas	2	1	210	1	100					
Oregon	1	1	160	0	0					
Colorado						2	1	480	1	480
Utah	1	0	0	1	80					
Washington	1	1	250	0	0					
Total charcoal and coke	166	63	12,150	103	11,751	245	161	106,267	84	42,398
Total anthracite	196	100	33,267	96	24,592					

SUMMARY.

FUEL.	IN BLAST.						OUT OF BLAST.			
	Number.			Weekly Capacity.			Number.		Weekly Capacity.	
		Month Previous.	Year Previous.		Month Previous.	Year Previous.		Month Previous.		Month Previous.
Charcoal	63	59	60	12,150	11,568	12,393	103	109	11,751	11,568
Anthracite	100	100	95	33,267	33,383	27,971	96	97	24,592	24,162
Bituminous	161	152	130	106,267	97,783	75,983	84	74	42,398	36,548
Total	324	311	285	151,684	142,734	116,347	283	280	78,741	72,278

DISTRIBUTION OF STEAM IN THE UNITED STATES.

At the eighteenth ordinary meeting of the Institution of Civil Engineers, (Great Britain) held on Tuesday, the 26th of March, Sir George B. Bruce, the president, in the chair, the paper read was on "The District Distribution of Steam in the United States," by Dr. Chas. E. Emery, M. Inst. C. E., of New York.

The author stated that in the United States the comparatively new industry of the transmission of steam underground from a central source of supply for a distance of a mile and upwards, and its distribution to buildings "on tap," the same as gas or water, had already been developed to an extent, and had achieved an importance not generally known. The paper referred to the distribution of steam with imperfect apparatus to detached buidings in the United States Naval Academy at Annapolis, as early as 1853; and cited the patent of Mr. Birdsill Holly, in 1877, which provided for a series of stuffing boxes separately anchored at the ends of pipe sections of about 100 ft., with service outlets in the stuffing boxes, from each of which steam could be delivered from a stationary point as readily as from a steam boiler. The author had designed and constructed the steam plant of the New York Steam Co., which had in use a length of about five miles of main steam pipes, much of which was 15 and 16 in. in diameter. The steam was distributed at the high pressure of 80 lbs. per square inch from a boiler station in which the boilers were arranged in four stories at the sides of central fire rooms, and the products of combustion were discharged into two chimneys. The plant was designed for boilers of 16,000 h. p., 12,000 h. p. being in position. The coal was carried by machinery to the top of boiler house, emptied into a bin and distributed through shoots to each boiler floor at the sides of the furnace-doors. The ashes passed from the ashpits through suitable shoots to the basement, and were discharged into cars, which were raised by a lift to the roof of a building in the rear, and emptied into carts for removal.

In constructing the street work the author dispensed with stuffing boxes, which were undesirable on account of the constant attention required to prevent leakage, and designed and applied a special expansion joint, for which the word "variator" had come into use. This joint was provided with diaphragms of thin corrugated copper, supported on radial backing plates, spanning the annular space represented by the exposed radial length of the diaphragm. The fatigue of the metal in the diaphragms of this joint had been thoroughly tested in advance by experiment, and the device had proved entirely successful in practice, providing for expansion without leakage, and not needing attention. This system was, after its introduction, adopted by the original Holly Co. for all subsequent plants, and many of the older installations were altered to use it. Steam plants on this plan were in regular use in 23 cities in the United States. Two companies started in opposition to the Holly Co. had failed, and three others, licensed under the patents of that company, had been suspended on account of financial difficulties. The paper was accompanied by illustrations showing full details of the improved expansion joints, and of the various connections to enable the work to be carried on without stopping for special arrangements. Ball joints were used at every street corner, and finally on the back of each expansion joint, provided with a single diaphragm, whereby slight changes in line or grade could be readily made even with the large pipes, and all strains prevented in connecting them. The pipes, in lengths of about 16 feet, were generally provided with flanges, whereby they were readily lowered into and adjusted in the trenches; and the joints, both flat and ball, were made with gaskets of thin corrugated copper covered with a coat of paint, and squeezed flat in place by the use of heavy flange bolts. A duplicate system of pipes for return water was laid in the same trench with the steam pipes. The larger pipes were supported by piers capped with stone placed about 15 feet apart; independent brick walls were built at the sides; the space between the pipes and walls was then filled with mineral wool, and the conduit thus formed covered with cross planks and roofing paper. At the dips in the pipe, traps were placed to carry off the water of condensation, and there were traps for draining the pipes and blow-offs, to which access was obtained from man-holes. The expansion joint developed considerable thrust, which was received on large castings anchored in the brickwork.

The main outlets, which were placed in the stationary bodies of the expansion joints, were each 3 in. in diameter, and generally closed with a screw plug, which could be removed through an ordinary gate valve, while steam was on, by a special tool; and a steam supply for 80 to 100 h. p. could be obtained in a few minutes. Most of the large pipes were made of lap welded wrought iron tubing ¼ in. thick, which was rolled into flanges with an improved boiler tube expander. Losses by condensation in this system of steam distribution were, contrary to general belief, very small. The principal difficulty was with leakage, as every one of the numerous valves leaked a little, and there were occasionally leaks such as occur in all steam work; but they could be kept under control with a properly organized force. The largest volume of steam was consumed during ordinary business hours, but there was an appreciable use in newspaper offices, eating houses, and for some manufacturing operations, during the night. The consumption in Summer for power was about one-half that during the winter. The double pipes of the average size cost, under the conditions in New York, $12.35 per foot, although such cost was charged at about $19.00 per foot on the books, to cover incidental expenses, engineering developments, and financial expenditure incident to the establishment of a new undertaking. The company had expended independent of work on another station, about £440,000; but of this a large amount could be properly assigned to other stations, provided the system were extended throughout the entire city. The author believed that a similar plant could be constructed complete for about £240,000; and where land was cheaper and the conditions less exacting, for £200,000. From a comparison of the increase in receipts year by year, he thought that, with prices obtainable in New York, a handsome dividend could be paid on these amounts. A formula was given for calculating the sizes of pipes. The causes and the prevention of "water rams," which were injurious to underground steam pipes, were discussed, and the system used for settling with the consumers was explained.

To avoid the confusion of a pound pressure with a pound weight, a pound of water evaporated into steam was called one kal, the price of which was charged from 30 to 70 cents per thousand kals to the consumers, according to the quantity used by each. The general introduction of steam enabled steam engines of any size to be worked in any part of a building, to drive machinery of any kind, to furnish electric light, and to pump water, etc.; and a building might be heated either with live or exhaust steam on any scale. The introduction of steam thus supplied to dwellings would not only furnish heat when required, but reduce the cost and discomfort of laundry and culinary work At any time of the day or night, by means of suitable vessels, the usual operations of domestic cooking could be carried out. The temperature of steam at ordinary pressures was insufficient for broiling and baking; but, with these exceptions, a family in a city with steam laid on could live comfortably in Summer and Winter without fire, and the attendant disadvantages resulting from smoke and the handling of coal and ashes.

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INDUSTRIAL SUMMARY.

New Enterprises :—

IRON AND STEEL.—A company is being organized at Fort Payne, Ala., with a capital of $300,000 to establish a large rolling mill.....A large plant is being erected near Chicago for making steel by the Robert process, introduced into this country by Mr. Bookwalter, of Springfield, O.....Messrs. Peters, who own the splendid Lawrence furnace property, at Ironton, O., have completed the necessary financial arrangements to erect on the old Lawrence furnace grounds a new coke and coal furnace.....Work was commenced last week on the new plant of the Union Drawn Steel Co., at Beaver Falls, Pa. The company will manufacture cold drawn steel, iron and other metals by patented processes and machinery fully controlled by them. The capital stock is $100,000, a large portion of it being held by Pittsburgh parties. The building will be 50 by 200 feet, one and a half stories high, and iron clad. The following officers have been elected: President, H. W. Hartman, Beaver Falls; vice-president, F. H. Adriance, Poughkeepsie, N. Y.; secretary and treasurer, William Anderton, Beaver Falls; superintendent, W. A. McCool.....The work of building up the iron town of New Birmingham, Texas, appears to be going on famously, under the direction of Mr. J. Warren Coleman, President of the Cherokee Iron Co. A 50-ton charcoal iron furnace and a large elegant hotel are now being erected, and a fine brick machine has been ordered from Ohio, which is now in operation. The building of the new Birmingham Wagon & Plow Factory is completed, and the works are now in operation. The engine and boiler for the foundry are already on the ground. The contract has been closed for a large modern rolling mill, the machinery for which will be ordered at once, and negotiations are pending for a nail mill, wire mill and stove foundry.

MACHINERY.—The Templin & Farrell Manufacturing Company, with $10,000 capital, has obtained a charter to manufacture plows, harrows, wagons, buggies, &c., at Topeka, Kas.....The Nashville Well Works & Tool Co. will put a force of men to work on the foundations for their new factories to be erected three-fourths of a mile east of Birmingham, Clay Co., Mo.....Incorporated: City Gas-Saving Co., Chicago; capital, $20,000; to manufacture automatic governors and gas-saving machines; incorporators, Joseph J. Joffin, Elmer A. Kimball, and Chas. J. Ford.....Articles of association were filed at Jefferson City by the following corporations: The C. W. Fairman Furnace & Stove Co., Kansas City; capital stock, $10,000; incorporators, C. W. Fairman, H. S. Douglas and others.....John Carey, Lewis H. Beck, F. A. Vaughan and others have chartered the Atlanta Machine Works, at Atlanta, with a capital of $50,000 and privilege of increasing it to $200,000. They have purchased the M'Comb & Taylor Iron Works for $19,000 and will repair them and put them in operation.....Mr. Levering, secretary of the Falls City Maleable Iron & Steel Co., of Louisville, Ky., is here at the Inn for the purpose of meeting our leading capitalists and discussing with them the possibility of establishing their edge tool plant here.—[Anniston (Ala.) Hot Blast.....It is claimed that the Falls City Malleable Iron & Steel Works, of Louisville, can make at a cost of 25 cents a mortising chisel used by wood-workers which now retails for $4.50. The company has received a proposition from a Canadian syndicate to establish works in Canada, which will secure the patent under the laws of that country and result in the establishment of a large factory there.

Enlargements, Additions, etc.:—

The Topeka (Kas.) Garden Tool & Implement Co. contemplate building new and larger works.....John Hickler & Son, Sault Ste. Marie, Mich., have begun the erection of an extensive addition to their machine works. They are putting up a masssive stone wall around their works, with a frontage on River street sixty feet and a depth of 135 feet. In this enclosure they will build immediately a foundry thirty-five feet square for the purpose of manufacturing castings and doing all kinds of molding.

Works Starting Up:—

The entire plant of the Bethlehem Iron Co., of Bethlehem, Pa., resumed opertions in full on Monday, the 1st inst. The price of puddling was reduced from $3.80 to $3.45 per ton.....The Millvale plant of Graff, Bennett & Co., at Pittsburgh, which has been idle since the failure of that firm, about a year ago, was put in operation on Monday, the 8th inst., by a syndicate of creditors represented by James Friend and F. N. Hoffstot.....McIlvane & Sons, of Reading, Pa., have resumed operations in their rolling mill, which has been idle for many weeks.....The nail factory of the Laughlin Nail Co., at Martin's Ferry, Ohio, after an idleness of six weeks, resumed operations in full on Monday, the 1st inst., giving employment to about 500 men.

Failures, Shut-downs and Wage Matters:—

The employes of the Crane Iron Co., at Catasauqua, Pa., have been notified of a reduction of wages, as follows: Keepers, $1.90 per day; first helper, $1.65; second helper, $1.50; fillers, $1.50; iron men, $1.50; laborers, $1.10, and all others, 10 per cent.....On Monday, the 1st inst., a notice was posted in the works of the Allentown Rolling Mill Co., at Allentown, Pa., announcing a reduction of wages. The pay of day puddlers will be $3.25 per ton hereafter, a reduction from $3.60. All other employes, except laborers, will be reduced 10 per cent. The pay of the laborers will remain as present, $1 per day.....The Plymouth Rolling Mill Co., Conshohocken, Pa., has made an assignment for the benefit of creditors. The concern is said to have been in straightened circumstances for five years. The company owns and operates a rolling mill and a blast furnace in Conshohocken and a blast furnace in Norristown. It is alleged that one of the furnace properties was recently transferred to Robert Fulton, manager of the Norristown furnace, a son of Samuel Fulton, the manager of the company.

Fires and Accidents:—

The tool house, offices, etc., of the Cincinnati Southern, at Somerset, Ky., were burned April 6th.....The main building of the Tyler (Tex.) Canning Co. was burned April 4th. Loss $21,000.....The Louisville Bridge & Iron Co.'s machine shops, at Louisville, Ky., were completely destroyed by fire on the 9th inst. A great deal of valuable machinery was ruined.....Last week the machinery warehouse of J. B. Sheriff, Son & Co. was destroyed by fire, entailing a loss of about $25,000. The insurance amounts to $13,000.....On Monday, the 1st inst., the extensive plant of the Arms-Bell Co., Limited, at Youngstown, O., manufacturers of nuts and bolts, was completely destroyed by fire. The loss was $80,000, partially covered by insurance. The firm will rebuild the plant as soon as the insurance is adjusted.....John A. McConnell & Co., non-conducting coverings, fire-proofing and heat insulating materials, Pittsburgh, Pa., write us: "Our warehouse and office were burned on April 5th, and a large stock of pipe covering and asbestos board injured by water. The fire originated from the burning of an adjoining building. Our insurance will cover two-thirds of the loss. While our warehouse is being repaired, we will ship promptly, direct from the factory."

Recent Big Runs:—

The Jones & Laughlin Steel Works, Pittsburgh, last week turned out 2,350 tons, the largest run on record for even that mammoth establishment..... Sarah furnace made 303 tons of iron in 6½ days last week. This was her best week's work.—[Ironton Register.....Last month the blast furnace of the Bellaire Nail Works, at Bellaire, Ohio, produced 5,031 tons of Bessemer pig iron, an average of about 162 tons per day.....At the new rail mill of the Allegheny Bessemer Steel Co., at Duquesne, Pa., there were recently rolled in 12½ minutes, 65 rails, each of which was 30 feet long. This plant is now running double turn in every department.....The blast furnace of the Belmont Nail Co., at Wheeling, W. Va., produced 3,400 tons of Bessemer pig iron during the month of March just closed.....Soho Furnace, of the Moorhead-McCleane Co., at Pittsburgh, produced 5,700 tons of Bessemer pig iron last month..... During the month of March there were turned out 2,500 tons of steel rails at the Edgar Thomson Steel Works of Carnegie Bros. & Co., Limited, at Braddock, Pa. This is the largest output in any one month in the history of the establishment.

What a Name!—

United States Vogel-Kazophone-and-Electrical Microphone-Trumpet-Acoustic-Electrometer-Power-Musical-Car-Distance-Loud-Speaking-Transfer-Instrument Co., of Chicago, has been incorporated; capital, $65,000,000; to manufacture instruments, rent rights and privileges; incorporators, Wm. Vogel, Adolph Gray, Richard H. Dakin.

General Industrial Notes:—

The Geneva (N. Y.) *Courier*, of recent date, contains a portrait and a three-column article on Mr. William B. Dunning, the well known proprietor of the New York Central Iron Works, at Geneva, at which is manufactured the celebrated Dunning boiler for house-heating. Mr. Dunning deserves the tribute, as he is a gentleman of indomitable pluck and energy.....Their business having outgrown their present quarters, the Brightman Stoker Co., Cleveland, have removed to more commodious quarters, 201-203 River street..... Messrs. A. & H. Gough, proprietors of the Industry File Works, 48 Columbus street, Cleveland, have been established since 1883. Their business has steadily grown, so that now it covers a large territory. They make a specialty of hand-cut files and rasps which, they claim, are equal to the best English file. They also re-cut old files. Mr. C. Gough has worked at the trade many years and he is at the present time general manager of this company. They make all designs of files, such as mill and round, flat and square, hand, warding and pillar, half-round and three-square.....We have just received from Hulbert Fence & Wire Co., St. Louis, Mo., their twelfth annual catalogue. It is a handsomely illustrated pocket edition, and contains the newest designs for fencing modern residence, cemetery or public grounds, as well as the cheapest farm fencings, with factory prices and freight rates to all parts of the United States. They will cheerfully mail catalogues to all who write and mention that they are readers of this paper.

Catalogues and Advertising Dodges:—

Very elegant hangers, circulars and chromo cards have been issued by the American Machine Co., Philadelphia, Pa., showing their ice cream freezers and hardware specialties. They are making quite a run on their "Gem" freezers. .....The Crescent Manufacturing Co., 3 and 5 Michigan street, Cleveland, have designed a very original and appropriate lithographed cover for their new catalogue of engineers' specialties, which they manufacture. Their specialties include the Crescent flue cleaner, the Crescent flue scraper, boiler tube cutter, roller tube expander, compression guage cup, shafting cup, belt clamp, hack saw, &c.....The Star Machine Co., 198 and 200 Terrace, Buffalo, N. Y., send us a very creditable circular of their portable forges and blacksmith's hand blowers.....The revised catalogue of the Canton Steam Pump Co., Canton, O., is very complete and satisfactory, and a credit to the company. They will be pleased to send a copy, with an elegant lithograph hanger, worked in six colors, to all desiring the same.....The Canton Steel Roofing Co., of Canton, O., are now doing business and completely settled in their new plant, the largest and most convenient of the kind in the country. They are evidently enjoying their anticipated increase of business, as a statement from them for the first quarter of 1889 shows an increase of 32 per cent. over the same period last year. They are sending out a neat and instructive catalogue to all inquirers.

WITH the return of Spring our esteeemed contemporary, the Cleveland IRON TRADE REVIEW, dons a new and decidedly becoming dress. We extend our congratulations, and hope that the prosperity which our contemporary has hitherto enjoyed, will abide with it through as many changes of dress as it cares to make.—[Age of Steel, St. Louis.

CONDITION OF THE BLAST FURNACES OF THE UNITED STATES.

April 1, 1889.

[CONDENSED FROM THE AMERICAN MANUFACTURER.]

LOCATION OF FURNACES.	CHARCOAL.					BITUMINOUS OR COKE.				
	Total No. of Stacks.	In Blast.		Out of Bl'st.		Total No. of Stacks.	In Blast.		Out of Bl'st.	
		No.	Week'y capac-ity.	No.	Week'y capac-ity.		No.	Week'y capac-ity.	No.	Week'y capac-ity.
New England	14	7	650	7	522					
New York	10	3	348	7	847	3	1	1,080	2	2,000
Pennsylvania	21	5	390	16	855					
Upper Susquehanna Valley						1	0	0	1	200
Pittsburgh						19	17	20,354	2	1,450
Spiegel						1	1	450	0	0
Allegheny Valley						2	1	597	1	125
Shenango Valley						22	16	11,608	6	3,076
Youghiogheny Valley						5	4	1,463	1	525
Juniata and Conemaugh Valley						22	13	6,322	9	2,965
Spiegel						1	0	0	1	250
Maryland	11	4	395	7	550	1	0	0	1	140
Virginia	22	1	40	21	1,110	12	10	3,863	2	1,758
North Carolina	2	1	153	1	240					
West Virginia	3	0	0	3	190	6	4	2,748	2	580
Ohio—Mahoning Valley						15	11	10,087	4	900
Eastern, Central and Northern						18	12	7,432	6	4,842
Hocking Valley						15	7	1,994	8	1,892
Hanging Rock	15	7	651	8	718	13	9	2,694	4	650
Miscellaneous	1	1	200	0	0	18	12	7,432	6	4,842
Kentucky						4	3	971	1	350
Hanging Rock	2	2	240	0	0					
Western Region and Miscellan'ous.	2	0	0	2	154					
Tennessee	8	2	734	6	757	10	9	4,458	1	400
Georgia	2	1	52	1	98	2	0	0	2	1,175
Alabama	10	9	1,628	1	300	22	16	9,523	6	2,541
Indiana						2	2	383	0	0
Illinois						16	8	9,790	8	6,720
Michigan	26	11	3,571	15	4,361	1	0	0	1	300
Wisconsin	8	4	1,801	4	489	4	2	1,308	2	882
Minnesota	1	0	0	1	140					
Missouri	3	2	677	1	240	8	2	1,230	6	3,355
Texas	2	1	210	1	100					
Oregon	1	1	160	0	0					
Colorado						2	1	480	1	480
Utah	1	0	0	1	80					
Washington	1	1	250	0	0					
Total charcoal and coke	166	63	12,150	103	11,751	245	161	106,267	84	42,398
Total anthracite	196	100	33,267	96	24,592					

SUMMARY.

FUEL.	IN BLAST.						OUT OF BLAST.			
	Number.			Weekly Capacity.			Number.		Weekly Capacity.	
		Month Previous.	Year Previous.		Month Previous.	Year Previous.		Month Previous.		Month Previous.
Charcoal	63	59	60	12,150	11,568	12,393	103	109	11,751	11,568
Anthracite	100	100	95	33,267	33,383	27,971	96	97	24,592	24,162
Bituminous	161	152	130	106,267	97,783	75,983	84	74	42,398	36,548
Total	324	311	285	151,684	142,734	116,347	283	280	78,741	72,278

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INDUSTRIAL SUMMARY.

New Enterprises:—

IRON AND STEEL.—A company is being organized at Fort Payne, Ala., with a capital of $300,000 to establish a large rolling mill.....A large plant is being erected near Chicago for making steel by the Robert process, introduced into this country by Mr. Bookwalter, of Springfield, O.....Messrs. Peters, who own the splendid Lawrence furnace property, at Ironton, O., have completed the necessary financial arrangements to erect on the old Lawrence furnace grounds a new coke and coal furnace.....Work was commenced last week on the new plant of the Union Drawn Steel Co., at Beaver Falls, Pa. The company will manufacture cold drawn steel, iron and other metals by patented processes and machinery fully controlled by them. The capital stock is $100,000, a large portion of it being held by Pittsburgh parties. The building will be 50 by 200 feet, one and a half stories high, and iron clad. The following officers have been elected: President, H. W. Hartman, Beaver Falls; vice-president, F. H. Adriance, Poughkeepsie, N. Y.; secretary and treasurer, William Anderton, Beaver Falls; superintendent, W. A. McCool.....The work of building up the iron town of New Birmingham, Texas, appears to be going on famously, under the direction of Mr. J. Warren Coleman, President of the Cherokee Iron Co. A 50-ton charcoal iron furnace and a large elegant hotel are now being erected, and a fine brick machine has been ordered from Ohio, which is now in operation. The building of the new Birmingham Wagon & Plow Factory is completed, and the works are now in operation. The engine and boiler for the foundry are already on the ground. The contract has been closed for a large modern rolling mill, the machinery for which will be ordered at once, and negotiations are pending for a nail mill, wire mill and stove foundry.

MACHINERY.—The Templin & Farrell Manufacturing Company, with $10,000 capital, has obtained a charter to manufacture plows, harrows, wagons, buggies, &c., at Topeka, Kas.....The Nashville Well Works & Tool Co. will put a force of men to work on the foundations for their new factories to be erected three-fourths of a mile east of Birmingham, Clay Co., Mo.....Incorporated: City Gas-Saving Co., Chicago; capital, $20,000; to manufacture automatic governors and gas-saving machines; incorporators, Joseph J. Joffin, Elmer A. Kimball, and Chas. J. Ford.....Articles of association were filed at Jefferson City by the following corporations: The C. W. Fairman Furnace & Stove Co., Kansas City; capital stock, $10,000; incorporators, C. W. Fairman, H. S. Douglas and others.....John Carey, Lewis H. Beck, F. A. Vaughan and others have chartered the Atlanta Machine Works, at Atlanta, with a capital of $50,000 and privilege of increasing it to $200,000. They have purchased the M'Comb & Taylor Iron Works for $19,000 and will repair them and put them in operation.....Mr. Levering, secretary of the Falls City Maleable Iron & Steel Co., of Louisville, Ky., is here at the Inn for the purpose of meeting our leading capitalists and discussing with them the possibility of establishing their edge tool plant here.—[Anniston (Ala.) Hot Blast.....It is claimed that the Falls City Malleable Iron & Steel Works, of Louisville, can make at a cost of 25 cents a mortising chisel used by wood-workers which now retails for $4.50. The company has received a proposition from a Canadian syndicate to establish works in Canada, which will secure the patent under the laws of that country and result in the establishment of a large factory there.

Enlargements, Additions, etc.:—

The Topeka (Kas.) Garden Tool & Implement Co. contemplate building new and larger works.....John Hickler & Son, Sault Ste. Marie, Mich., have begun the erection of an extensive addition to their machine works. They are putting up a masssive stone wall around their works, with a frontage on River street sixty feet and a depth of 135 feet. In this enclosure they will build immediately a foundry thirty-five feet square for the purpose of manufacturing castings and doing all kinds of molding.

Works Starting Up:—

The entire plant of the Bethlehem Iron Co., of Bethlehem, Pa., resumed opertions in full on Monday, the 1st inst. The price of puddling was reduced from $3.80 to $3.45 per ton.....The Millvale plant of Graff, Bennett & Co., at Pittsburgh, which has been idle since the failure of that firm, about a year ago, was put in operation on Monday, the 8th inst., by a syndicate of creditors represented by James Friend and F. N. Hoffstot.....McIlvane & Sons, of Reading, Pa., have resumed operations in their rolling mill, which has been idle for many weeks.....The nail factory of the Laughlin Nail Co., at Martin's Ferry, Ohio, after an idleness of six weeks, resumed operations in full on Monday, the 1st inst., giving employment to about 500 men.

Failures, Shut-downs and Wage Matters:—

The employes of the Crane Iron Co., at Catasauqua, Pa., have been notified of a reduction of wages, as follows: Keepers, $1.90 per day; first helper, $1.65; second helper, $1.50; fillers, $1.50; iron men, $1.50; laborers, $1.10, and all others, 10 per cent.....On Monday, the 1st inst., a notice was posted in the works of the Allentown Rolling Mill Co., at Allentown, Pa., announcing a reduction of wages. The pay of day puddlers will be $3.25 per ton hereafter, a reduction from $3.60. All other employes, except laborers, will be reduced 10 per cent. The pay of the laborers will remain as present, $1 per day.....The Plymouth Rolling Mill Co., Conshohocken, Pa., has made an assignment for the benefit of creditors. The concern is said to have been in straightened circumstances for five years. The company owns and operates a rolling mill and a blast furnace in Conshohocken and a blast furnace in Norristown. It is alleged that one of the furnace properties was recently transferred to Robert Fulton, manager of the Norristown furnace, a son of Samuel Fulton, the manager of the company.

Fires and Accidents:—

The tool house, offices, etc., of the Cincinnati Southern, at Somerset, Ky., were burned April 6th.....The main building of the Tyler (Tex.) Canning Co. was burned April 4th. Loss $21,000.....The Louisville Bridge & Iron Co.'s machine shops, at Louisville, Ky., were completely destroyed by fire on the 9th inst. A great deal of valuable machinery was ruined.....Last week the machinery warehouse of J. B. Sheriff, Son & Co. was destroyed by fire, entailing a loss of about $25,000. The insurance amounts to $13,000.....On Monday, the 1st inst., the extensive plant of the Arms-Bell Co., Limited, at Youngstown, O., manufacturers of nuts and bolts, was completely destroyed by fire. The loss was $80,000, partially covered by insurance. The firm will rebuild the plant as soon as the insurance is adjusted.....John A. McConnell & Co., non-conducting coverings, fire-proofing and heat insulating materials, Pittsburgh, Pa., write us: "Our warehouse and office were burned on April 5th, and a large stock of pipe covering and asbestos board injured by water. The fire originated from the burning of an adjoining building. Our insurance will cover two-thirds of the loss. While our warehouse is being repaired, we will ship promptly, direct from the factory."

Recent Big Runs:—

The Jones & Laughlin Steel Works, Pittsburgh, last week turned out 2,350 tons, the largest run on record for even that mammoth establishment..... Sarah furnace made 303 tons of iron in 6½ days last week. This was her best week's work.—[Ironton Register.....Last month the blast furnace of the Bellaire Nail Works, at Bellaire, Ohio, produced 5,031 tons of Bessemer pig iron, an average of about 162 tons per day.....At the new rail mill of the Allegheny Bessemer Steel Co., at Duquesne, Pa., there were recently rolled in 12½ minutes, 65 rails, each of which was 30 feet long. This plant is now running double turn in every department.....The blast furnace of the Belmont Nail Co., at Wheeling, W. Va., produced 3,400 tons of Bessemer pig iron during the month of March just closed.....Soho Furnace, of the Moorhead-McCleane Co., at Pittsburgh, produced 5,700 tons of Bessemer pig iron last month..... During the month of March there were turned out 2,500 tons of steel rails at the Edgar Thomson Steel Works of Carnegie Bros. & Co., Limited, at Braddock, Pa. This is the largest output in any one month in the history of the establishment.

What a Name!—

United States Vogel-Kazophone-and-Electrical Microphone-Trumpet-Acoustic-Electrometer-Power-Musical-Car-Distance-Loud-Speaking-Transfer-Instrument Co., of Chicago, has been incorporated; capital, $65,000,000; to manufacture instruments, rent rights and privileges; incorporators, Wm. Vogel, Adolph Gray, Richard H. Dakin.

General Industrial Notes:—

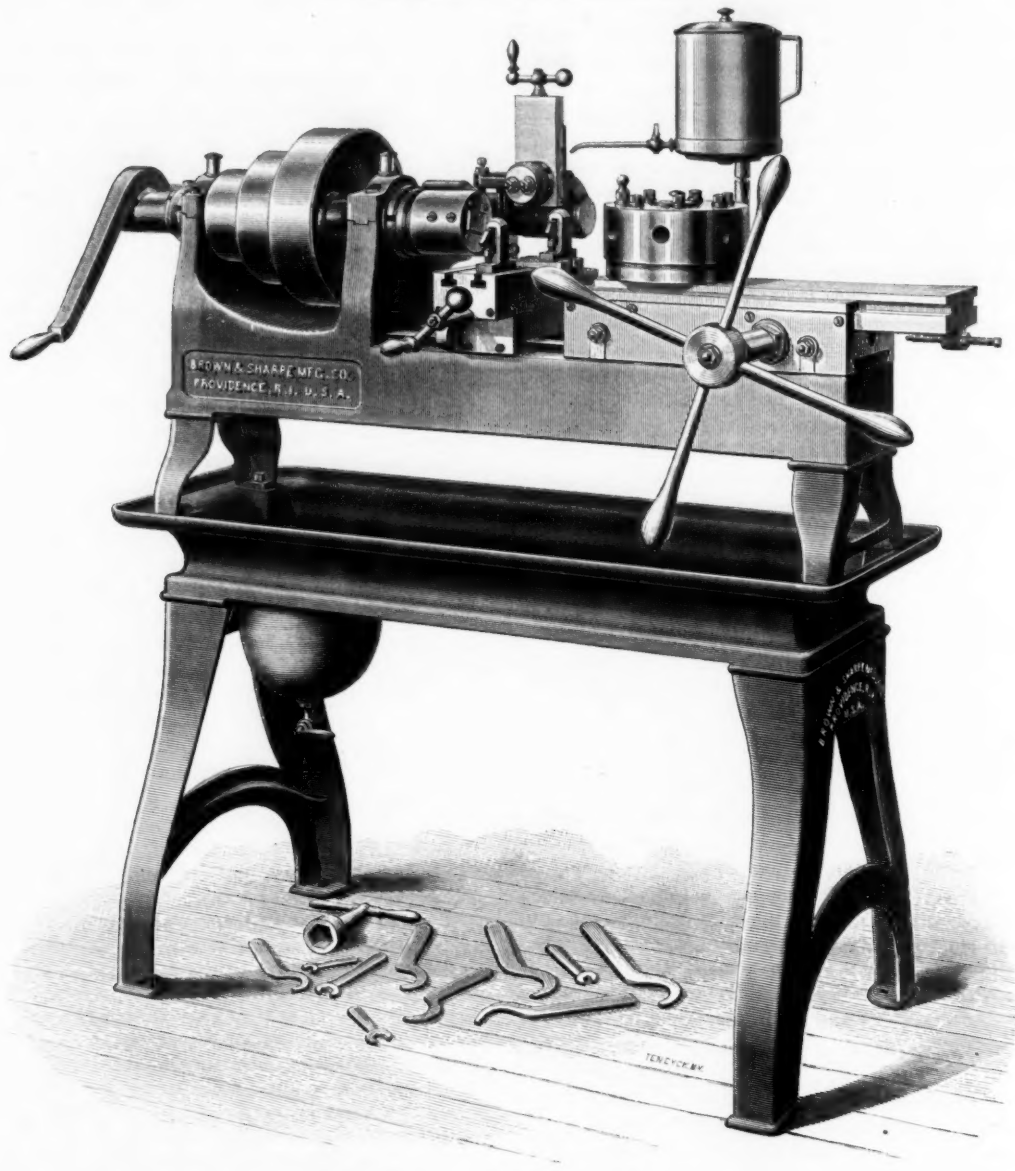
The Geneva (N. Y.) *Courier*, of recent date, contains a portrait and a three-column article on Mr. William B. Dunning, the well known proprietor of the New York Central Iron Works, at Geneva, at which is manufactured the celebrated Dunning boiler for house-heating. Mr. Dunning deserves the tribute, as he is a gentleman of indomitable pluck and energy.....Their business having outgrown their present quarters, the Brightman Stoker Co., Cleveland, have removed to more commodious quarters, 201–203 River street..... Messrs. A. & H. Gough, proprietors of the Industry File Works, 48 Columbus street, Cleveland, have been established since 1883. Their business has steadily grown, so that now it covers a large territory. They make a specialty of hand-cut files and rasps which, they claim, are equal to the best English file. They also re-cut old files. Mr. C. Gough has worked at the trade many years and he is at the present time general manager of this company. They make all designs of files, such as mill and round, flat and square, hand, warding and pillar, half-round and three-square.....We have just received from Hulbert Fence & Wire Co., St. Louis, Mo., their twelfth annual catalogue. It is a handsomely illustrated pocket edition, and contains the newest designs for fencing modern residence, cemetery or public grounds, as well as the cheapest farm fencings, with factory prices and freight rates to all parts of the United States. They will cheerfully mail catalogues to all who write and mention that they are readers of this paper.

Catalogues and Advertising Dodges:—

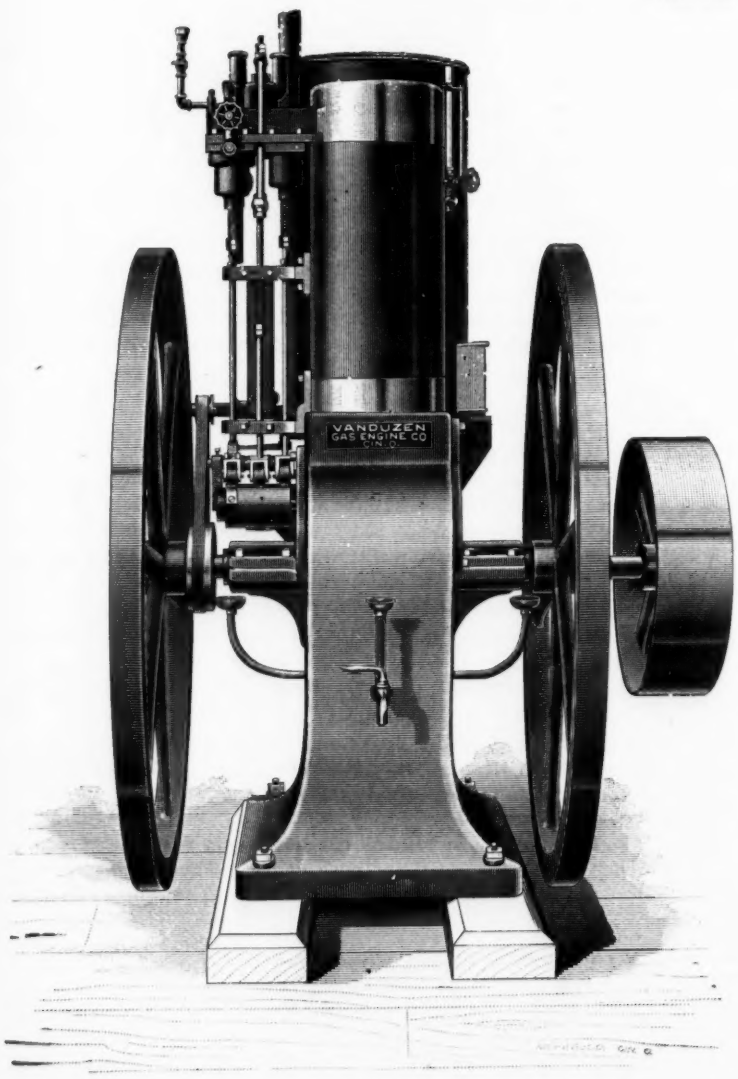
Very elegant hangers, circulars and chromo cards have been issued by the American Machine Co., Philadelphia, Pa., showing their ice cream freezers and hardware specialties. They are making quite a run on their "Gem" freezers. .....The Crescent Manufacturing Co., 3 and 5 Michigan street, Cleveland, have designed a very original and appropriate lithographed cover for their new catalogue of engineers' specialties, which they manufacture. Their specialties include the Crescent flue cleaner, the Crescent flue scraper, boiler tube cutter, roller tube expander, compression guage cup, shafting cup, belt clamp, hack saw, &c.....The Star Machine Co., 198 and 200 Terrace, Buffalo, N. Y., send us a very creditable circular of their portable forges and blacksmith's hand blowers.....The revised catalogue of the Canton Steam Pump Co., Canton, O., is very complete and satisfactory, and a credit to the company. They will be pleased to send a copy, with an elegant lithograph hanger, worked in six colors, to all desiring the same.....The Canton Steel Roofing Co., of Canton, O., are now doing business and completely settled in their new plant, the largest and most convenient of the kind in the country. They are evidently enjoying their anticipated increase of business, as a statement from them for the first quarter of 1889 shows an increase of 32 per cent. over the same period last year. They are sending out a neat and instructive catalogue to all inquirers.

WITH the return of Spring our esteeemed contemporary, the Cleveland IRON TRADE REVIEW, dons a new and decidedly becoming dress. We extend our congratulations, and hope that the prosperity which our contemporary has hitherto enjoyed, will abide with it through as many changes of dress as it cares to make.—[Age of Steel, St. Louis.

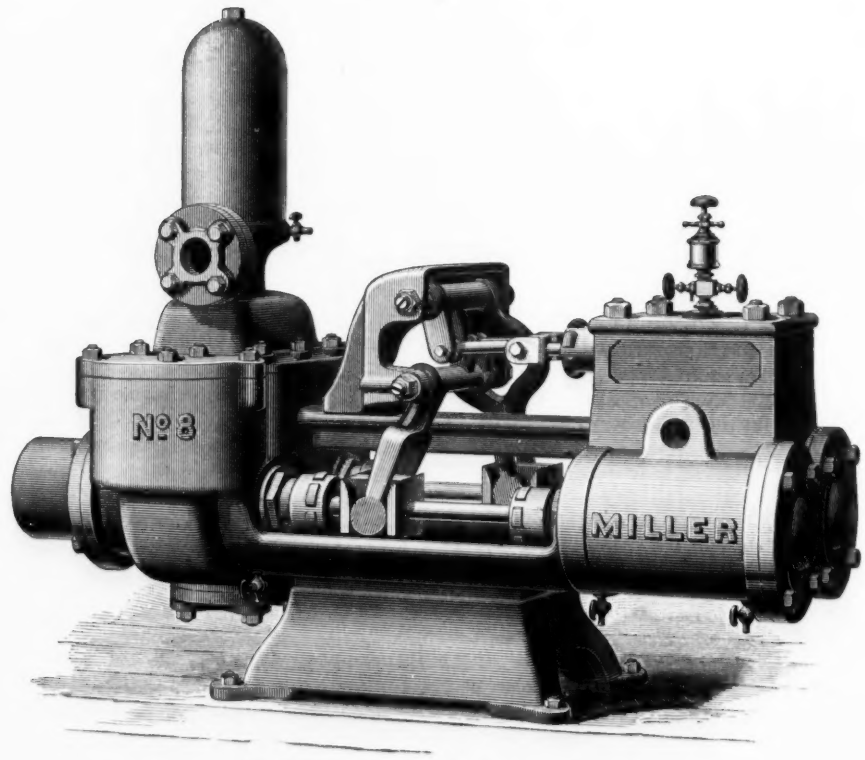
MACHINERY RECENTLY BROUGHT OUT.



IMPROVED SCREW MACHINE.



THE VAN DUZEN GAS ENGINE.



THE MILLER DUPLEX PUMP.

MACHINERY RECENTLY BROUGHT OUT.

Improved Screw Machine.

We illustrate on opposite page the No.5 improved screw machine made by the Brown & Sharpe Manufacturing Co., of Providence, R. I. In some respects the name of this machine is not entirely satisfactory. It does not fully indicate the purposes for which machines of this class are frequently used. Designed, primarily, for making screws and useful for this purpose, whenever screws are not required in sufficient quantities to render entirely automatic machines preferable. They are also and perhaps chiefly used in making a large variety of pieces from iron or steel bars, and in finishing castings or forgings that may be held in a chuck while subjected to one or more operations. In the shops of the manufacturers of the machine, illustrated, for example only one out of every eight screw machines is usually employed in making screws. Three-eighths are ordinarily employed in finishing studs, nuts, washers, castings, pins, handles, etc. from round, square or hexagonal bars, while one-half the machines of this class are generally employed on small wheel, levers or cams of sewing machines, or on small parts of machine tools. So many small parts of machine tools, in fact, have come to be made upon screw machines in Brown & Sharpe's shops that in making the drawings of these machines this company devoted detailed sheets to "small parts made on screw machines." Opportunities for employing these machines in manufacturing are more apparent each day and cannot be too strongly brought to the attention of mechanics. The various tools used upon one piece remaining in the same relation to each other and being ready to produce the same result upon any number of pieces, insure (in comparison with the lathe) a superior quality of work and a saving of cost. In considering the cost of work made from the rough bar, it should not be overlooked that there is a saving of labor of making forgings from which in the lathe similar pieces are made. Saving in time is one of the great advantages in using screw machines, for when the bars, castings or forgings are once fixed in the chuck the work can be completed without further adjustment, while in the lathe a large number of adjustments are necessary. In the machine illustrated ten tools can be used without removing the work from the chuck. A lever, to be used in operating the cutting-off slide in place of the screw shown in cut, is furnished when desired. The turret head is secured in position by a simple and durable device. The spindle boxes, 2¾″ and 2¼″ in diameter, and 3⅞″ and 2⅞″ long are steel, hardened and ground inside and out. The spindle is also steel; its front bearing is hardened and both bearings are ground. The spindle cone has three grades, 6″, 8½″ and 11″ diameter, for 3″ belt. Size of hole through spindle, 1 9-32″; number of holes in revolving head, 7; diameter of holes in revolving head, 1 1-16″; movement of revolving head slide, 9⅝″; length that can be milled 6″; swing over slide rest, 6¼″; swing over bed, 13⅜″; length of bed, 50″; countershaft has friction pulleys 14″ diameter, 3½″ face, and should run 190 turns per minute; weight, ready for shipment, 1,450 lbs; floor space measured over extreme projections, 32x62″.

The Miller Duplex Pump.

We illustrate herewith one size of a line of duplex pumps for boiler feeding, brewery, mining, fire and other purposes, manufactured by the Canton Steam Pump Co., of Canton, O., known as the Miller Duplex. A few of the features these pumps possess, by which the manufacturers claim they are greatly improved over other duplex pumps intended for the same duties, are as follows:

The arrangement of the levers, as will be seen by the engraving, are very different from the old style commonly used on pumps of this variety, and admits of the wear being taken up centrally without changing the position of the levers, thereby keeping the stroke always the same. By the use of these improved levers, the pump is made more compact and floor space economized. The cylinders in the water end of the pump on all sizes are of brass or extremely hard composition metal suited for the purpose the pump is required for, and can be quickly and easily removed. For handling dirty or gritty water, these cylinders are especially desirable, as they can be entirely replaced at a very trifling cost comparatively, the water valves are very accessible, and each set can be be removed independent of the others. Each pump is fitted with valves especially adapted for the purpose it is required for. Every part of a steam pipe should be very accessible. The Miller duplex pumps are designed so that this essential feature is combined with the other desirable points these pumps possess. The stuffing boxes and glands are of brass, and there is ample space for packing in these. All the moving parts are interchangeable, and with the exception of the levers, there are no rights or lefts.

All the drippings, etc., are conveyed away by means of a pipe running from trough of pump. Sectional views show other features of equal importance which limited space forbids our calling attention to at this time. The company make a special effort to employ the very best of skill and quality of material in the manufacture of their pumps, and build a strictly first-class pump in every respect. The company also assures us that it is a pleasure for them to answer correspondence or to give any information possible.

The Van Duzen Gas Engine.

The power and efficiency and the economical working of any gas engine primarily depend on the proper admixture of air and gas, as well as certain conditions regarding its ignition. In the Van Duzen gas engine, herewith shown, these prime conditions have been so thoroughly mastered that the manufacturers claim, with apparent good reason, that it works on new principles, since it is a departure from all other engines in constructive design. In the first place it is of the vertical type. By this method of construction the makers not only reduce the friction of all working parts but they succeed in obtaining an engine which is entirely self-contained. The cylinder is directly above the center of the crank-shaft, which is in turn directly above the mass of the base—as a consequence all strains are directly *contra* to the mass of the engine (*i. e.*, the base), in place of being at right angles to the same, as in the horizontal type of engine.

In this engine, also, the concussion resulting from the ignition of the charge, which is, of necessity, about the same in all gas engines, is assimilated by the solid and secure base, thus preventing unpleasant jarring. Add to this the fact that the entire base is in one casting, and the advantage of this form of casting will become at once apparent. Another feature worthy of especial note is the governor. It is of the makers' own special design and construction and is adapted for use in no other engine. In its general design the makers have followed the principle in vogue in the construction and action of governors used in the modern high grade steam engine, *i. e.*, direct and positive control of the valves, admitting the motive element, from the main shaft of the engine. This governor has absolute control over the supply of gas and air admitted to the cylinder under all varying loads or conditions. Should the main belt break or be suddenly thrown off, the speed of the engine would not vary, but the supply of gas and air would instantly be reduced to such quantity as would be sufficient to cause the engine to run at the one unvarying speed.

Another new departure (for gas engines) is the use of direct-acting poppet-valves. The action of these poppet-valves is almost instantaneous, so that there is neither lead nor back pressure, and consequently no waste through unconsumed or improperly mixed gases. As there is no sliding motion, there is no necessity for lubrication about a poppet-valve, and the particles of carbon pass out as dust, and do not form any "gumminess" about either valve or seat. This is claimed, also, to be the only gas engine which has all water connections completed before shipment, and the only gas engine which does not require a constant stream of fresh, cold water.

Still another sweeping claim made for the Van Duzen is that it is the only gas engine which does not admit air at the receiving stroke of the piston. In this engine no air is admitted to the cylinder except when accompanied with its proper proportion of gas. It is also asserted that this is the only gas engine which ignites the charge under compression and hot. The cylinder extends above the upper dead point of the piston, about one-half its sweep, and forms the chamber in which the charge is compressed and exploded. By compression the potential energy of the charge is increased to the highest possible limit, and this extension of power means a decrease in the amount of gas required. As to the second point, the makers say: "With every make of gas engine except the Van Duzen, it is absolutely necessary to keep the cylinder and chamber constantly cool by means of large and never ceasing streams of fresh cold water, because ours is the only gas engine made which perfectly lubricates the interior of the cylinder with oil and water. By heating the charge we secure an almost instantaneous, and therefore complete ignition of the entire charge; consequently there can be no unconsumed gas to be forced out through the exhaust valve and wasted." The advantage in the saving of water will, therefore, be apparent. Of course it follows that, where there are no slide valves to clean and regrind, there must be a considerable saving in the cost of attendance.

The entire works of the Van Duzen Gas Engine Co., of Cincinnati, are devoted to the manufacture of this engine exclusively. Each of the proprietors has had a personal, practical and successful experience of from 40 to 50 years as manufacturer of engines, machinery and mechanical appliances.

IRON-MAKING ON PUGET SOUND.

Mr. A. N. Hungerford, of San Francisco, writes the *Bulletin* of the American Iron and Steel Association, as follows:

The Puget Sound Iron Co., although incorporated on November 21, 1881, with a capital of $500,000, was not fairly started on a proper basis until the summer of 1888, when large improvements were made in the works and a new bosh put in the furnace, which was put in blast on September 1st of that year. In November, 1888, the furnace produced 918 tons of pig iron, and in the following December 1,008 tons were made.

Port Townsend, in Washington Territory, is the principal port of entry of Puget Sound. A short distance South of this city the Puget Sound Iron Co. selected as a site for its furnace a plot of land of fifty acres, having a water-frontage of over 1,000 feet on Port Townsend Bay. On this tract they laid out a town, named it Irondale, and erected the furnace. Wharves were built, and charcoal kilns, coal sheds, and other necessary buildings erected. Adjoining this lot is another tract of 568 acres, well wooded, and containing iron ore beds. The Company also owns, on Texada Island, in the Strait of Georgia, on the direct water-way to Alaska, and about 130 miles from Irondale, a tract of 2,412 acres, having a good frontage on Gillies Bay, on which are extensive beds of magnetic ore. Plenty of limestone for fluxing can be had in immediate proximity to the ore beds.

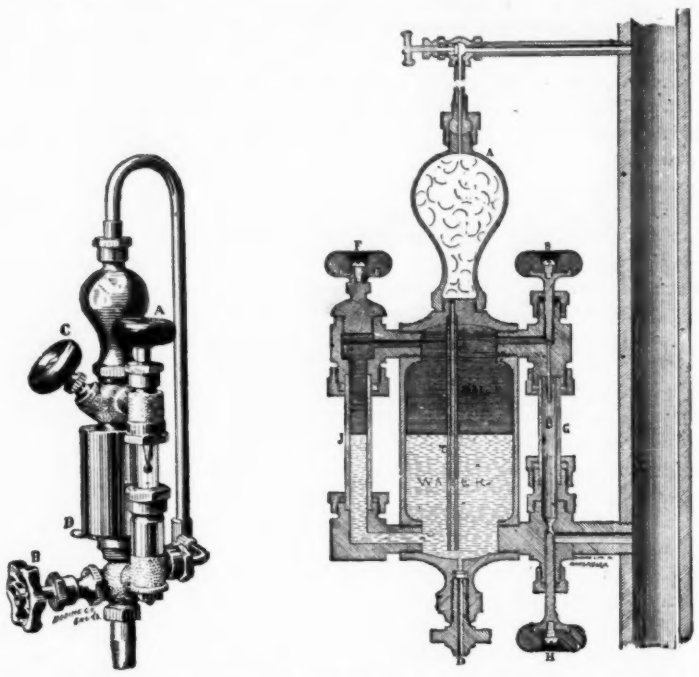
The ore crops out in knobs, varying in area. One outcrop is about 800 feet by 2,000 feet. These knobs lie from 250 to 600 feet above the level of the sea. An analysis of the ore in these beds was made on June 26, 1874, by Edward J. Chapman, Ph. D., of Toronto, Can., with the following result: Black magnetic ore, of course granular structure; average specific gravity, 4.71; average weight per cubic foot, 293½ pounds; average composition—protoxide of iron, 28.33 per cent.; sesquioxide of iron, 67.31 per cent.; oxide of manganese, trace only; titanic acid, 0.11 per cent.; phosphoric acid, 0.07 per cent.; sulphuric acid, 0.09 per cent.; silica and silicious rock matter, 3.97 per cent.; total, 99.88 per cent., which is equivalent to 69 per cent. of metallic iron.

The company began operations in 1881 by building, as an experiment, an old-fashioned stone open-top furnace. The present furnace has recently been improved, and it now has an iron jacket set on columns, a stack 50 feet high, a bosh 10 feet in diameter, a hearth 5 feet in diameter, and 5 4-inch tuyeres.

SOME STANDARD LUBRICATORS.

The "Unique" Automatic Lubricator.

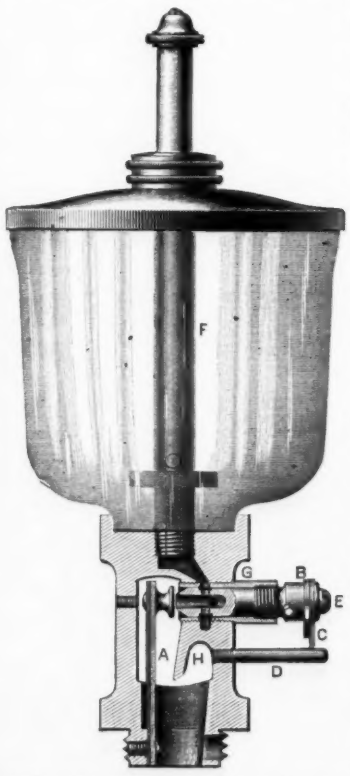
Among the advantages claimed for this lubricator are the following: The oil being fed down through a steam-filled glass gauge (instead of being floated up through water), cannot congeal, and feeds readily in the coldest weather beeswax, tallow, or any known lubricant, from one drop per minute to a stream. Having only one connection, it is very readily and easily attached. This lubricator can be attached to traction engines, small engines, steam pumps, etc., in one-third the time of any other sight-feed device, and by any engineer. As a drop of oil fed down through steam is much smaller than one fed up through water (the proportion being about 1 to 7 in favor of the steam feed), one can,



by using this lubricator, give the engine oil more frequently in smaller quantities than with ordinary up-feed lubricators. The philosophy of the above is apparent. Any engineer will see that it is better to give his engine small quantities of oil frequently than large doses semi-occasionally. A one-third pint cup, feeding ten drops per minute, will run for ten hours. The sight-feed glass is always clean and bright, and does not require blowing out, every few days, to keep it clean enough to see the drop. This advantage will be appreciated by engineers who have used the up-feed, and been obliged to blow water out of the feed-glass and wait half an hour or more for condensation to refill same just when engine needed oil most. Its construction is such that it can be attached directly to steam chest without prejudicing its working qualities in the least. Manufactured by the Unique Lubricator Co., Mansfield, O. Such well-known firms as the Aultman-Taylor Co., of Mansfield, O., and the Haber Manufacturing Co., of Marion, O., highly recommend this lubricator.

Brown's Self-Regulating Oil Cup.

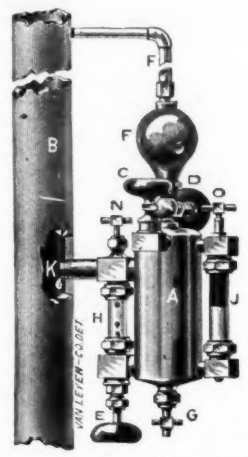
It is an easily demonstrable fact that bearings can be run with quite as little friction and with a much smaller quantity of oil than is ordinarily fed to them. If the engineer were to stand by a bearing and administer to it only that quantity of oil required to keep it in good condition, he would find that it would require only from one-fifth to one-tenth of that which he is in the habit of feeding it normally. A slight change in the condition under which the bearing is at work, an increase of strain on a neighboring belt, the working in of a particle of grit, might call at once for an increased allowance temporarily, and as constant observation is impracticable, a normal feed considerably exceeding that ordinarily required for perfect lubrication is a practical necessity. The cup illustrated herewith is intended by its inventor, Gilman W. Brown, to overcome such necessity, and to furnish automatically a supply of oil which will keep the bearing in proper running condition and no more. He has, so to speak, furnished the cup with a set of brains by which it accomplishes the same result that a man would who stood with his hand up to the bearing and regulated the feed of the cup to its varying temperature. Its essential feature consists in the thermostatic bar A, which is composed of strips of brass and steel. By a simple adjustment the valve is so set that at the normal temperature of the room the cup, when opened, will feed at the lowest rate compatible with easy running of the bearing. If for any cause the bearing commences to heat, the difference in expansion of the brass and steel of the thermostatic bar will cause it to move outward at the top, carrying the valve upon its upper end away from its seat, and increasing the allowance of oil, which will



be again reduced when the temperature decreases, and at all times maintained at the minimum. The feed may be stopped altogether when shutting down by simply turning one of the wings, B, down against the stop pin, and should the attendant forget to turn the cup on when starting, no harm can result, as it would commence to feed automatically after the bearing had warmed up a few degrees. The design of the cup as a cup is excellent, being unencumbered with brass trimmings outside, it permits an unobstructed view of the oil from all directions. It can be readily filled, and wiped out on the inside and thoroughly cleaned in every respect without removal from the bearing. Crosby Steam Gauge & Valve Co., 93 Oliver street, Boston, Mass., General Agents.

The Detroit Lubricator.

The introduction of the Detroit sight-feed lubricators (here shown) has it is claimed, worked an entire revolution in lubricators and methods of oiling. By their use all wearing parts of the engine, from throttle valve down, receive just the quantity of oil needed continuously while the engine is working. The method of oiling by means of these lubricators consists in introducing the oil drop by drop into the steam pipe, where it atomizes and mingles with the steam, and is carried to every part of the valves and cylinder, lubricating all parts reached by the steam.



The sight-feed feature, which shows the oil rising drop by drop on its way to the parts to be lubricated, enables the engineer to see at a glance how rapidly the oil is being fed, and by the use of the feed valve he can adjust the lubricator to feed any quantity desired; even as low as one drop in five minutes. When the feed is once regulated it need not be changed until the oil is exhausted, though the engine may run a week.

A clearer idea of the construction will be had by reference to the accompanying cut: A is the oil reservoir; B, steam pipe; C, oil filler; D, water feed valve; E, valve to regulate flow of oil; F, F, steam tube and condensing chamber; G, drain valve to draw off water, to prevent freezing, etc.; H, sight-feed glass; J, glass indicator; K, oil discharge pipe; N, valve to correct pulsation or unsteadiness in feed; O, vent. These lubricants are claimed to effect a saving in oil of from 50 to 90 per cent. over old methods, and the saving in wear of machinery by their use can hardly be estimated. Manufactured by the Detroit Lubricator Co., Detroit, Mich.

MOLECULAR PHYSICS IN RELATION TO STEEL.

BY JACOB REESE.

WRITTEN FOR THE IRON TRADE REVIEW.

Molecular physics is that department of science that treats of the initial laws of matter. For instance, taking a bar of iron or steel, the physicist says "This is not a solid body, it may be physically divided. The end of physical division is the molecule. The molecule may be divided by chemical action. The end of chemical action is the atom. Atoms *per se* are inert. Their energy is derived from the physical forces, *i. e.*: the force of attraction, which is adherent and tends to draw the particles together and hold them in a state of rest, and the force of caloric which tends to push the articles from each other into a state of activity. By virtue of these two forces the atoms unite and form molecules, and the molecules assume a physical structure in which neither the atoms in the molecules nor the molecules in the physical structure touch each other, by impact, at any time, nor are they, at any time, in an absolute state of rest."

"Temperature is the measure of molecular velocity as weight is the measure of matter." Consequently an increased temperature indicates an increased molecular activity, and this requires more room for undulation; therefore, increased temperature expands the metal, and decreased temperature contracts it. This law has nothing to do with fluids expanding at the moment of solidification.

All revolving and undulating bodies tend to produce a greater diameter along the line of greatest travel, and least at the line of least motion. The earth has a greater diameter at the equator, and less at the poles. It is therefore assumed that molecules have also long equators, and short pole diameters. The energizing force, caloric, or electricity, when free, always passes from the higher to the lower degree of activity; hence, in passing out of the molecule, will always pass out of the poles, they being the path of least motion.

When molten metal is run into a mold the molecules travel on a line with their equators, by reason of the same law that wood floats lengthwies down stream; but when the molecules touch the sides of the cold mold they turn over and place their poles against the cold sides that the caloric may readily escape. The equators thus taking the places of the poles require more room, and the metal is expanded at the moment of solidification; but it contracts immediately after by reason of a decreased molecular activity, as before explained. This is the reason cast iron expands at the moment of solidification, and why steel is lighter after being tempered or hardened than before.

PITTSBURGH, Pa., April 13, 1888.

OUR valued contemporary, the IRON TRADE REVIEW, of Cleveland, O., has made a very attractive departure in its make-up. It dispenses with the ornamental features of a cover and other displays, and begins to talk to its readers on the first page. The letter press, proper, appears in two broad columns to every page. The printing and press work are models of neatness and clearness, and the REVIEW's deliverances are up to its accustomed standard of excellence.—[Manufacturers' Record, Baltimore.

AMONG THE IRON MINES.

Menominee Range:—

The Hamilton shaft has now reached a depth of 1,250 feet and is still going Chinaward. About 40 tons is being raised daily, which could easily be increased to 150 tons if the ore is wanted. It is not likely, however, that a large output will be sought for, the present purpose of the company being to open up a larger territory before the actual work of mining begins.—[Menominee Range, Iron Mountain.

The Penn Iron Mining Co. has discontinued operations at the Central Vulcan shaft, the ore lens having been cut out. The pumps are being taken out, and some extensive explorations are being made in the vicinity of the past workings. About 3,000 tons of very fine ore has been mined this winter, and there is every reason to suppose that some of the other small lenses known to exist on the property will develop into paying deposits.—[Current.

Capt. W. R. Calhoun, the veteran explorer, in conversation with a Florence (Wis.) *Mining News* reporter the other day, said that he sincerely believed that an iron mine will one of these days be found east or south-east of Fisher Lake, between this city and Commonwealth. There is every indication of iron in the territory indicated, but no exploring whatever has ever been done there. "Cal," who has spent months of valuable time and thousands of dollars seeking a mine west of the Florence, is thoroughly convinced that it is useless to look for the metal in that direction. He, like many others, however, is strongly of the opinion that the Florence district is dotted here and there with many a rich iron mine, some of which, he thinks, will be discovered and developed within the next ten years. The captain says if he were a resident of Florence and had sufficient capital at his command, he would explore between Florence and Commonwealth, and has no doubt that he would find ore. The land he refers to belongs to H. D. Fisher.

There is a probability that the company, of which Capt. W. R. Calhoun is the representative, will soon take hold of the Caledonia mine, in the Crystal Falls district. Capt. Calhoun visited the property on Wednesday, and, it is understood, has made a favorable report to his company. The Caledonia yields a high grade of ore and the deposit is a large one. It is what is known as a wet mine, but the Calhoun folks have adequate pumps, boiler and other machinery, which were used in their old exploration in this district, and could take control of the Caledonia and begin the developmental work at once, without very much expense. E. E. Keyes and A. E. Guensburg, of this city, are largely interested in the property.—[Mining News, Florence, Wis.

Marquette Range:—

At the annual meeting of the shareholders of the Ishpeming Iron Co., recently held in this city, the following named gentlemen were elected directors for the ensuing year: W. H. Johnson, J. W. Jokim, W. H. Rood, D. McVichie, H. Harwood and C. R. Ely. Officers were chosen as follows: President, W. H. Rood; vice-president, J. W. Jockim; treasurer, W. H. Johnson; secretary, C. R. Ely. Power was voted the board to sell a portion of all the lands of the company if deemed advisable. These comprise 2,800 acres in this county, nearly all of which is in the iron ore belt. The fee of the property is considered to be a valuable one. The present company has been in possession for a uumber of years, during which time but little has been done in the way of exploration, and this in a very crude way. Some of the lands are in the gold-bearing horizon and may possess the more precious metals. The company will take some steps to bring the mineral of the property to surface, a fact that will be appreciated by the shareholders.—[Iron Ore.

The Cheshire mine, which has been idle for a couple of years, is to be got into shape for production as soon as possible, One of the Messrs. Pierce, who controlled the mine, has retired, the other retaining a small interest.

One of the owners of the East New York and America mines informed a reporter of the *Mining News* that the two properties will produce 100,000 tons of ore this season—the East New York 75,000 tons and the America 25,000 tons. Both mines yield an excellent quality of Bessemer ore and are properties of great promise.

Gogebic Range:—

At the Colby the new shaft is down about 290 feet, or about 15 feet below the fourth level. The fourth and fifth levels are opened out about 360 and 300 feet, respectively, east of where the cross-cuts will be started to reach No. 5 shaft. The sixth level has about 50 feet further to go before cross-cutting to this shaft can be commenced, so it will be seen that the Colby will be opened up and in excellent condition to extract all the ore that can be profitably sold. The new pocket that we mentioned in a former issue is being pushed rapidly forward.—[Iron Spirit.

The Norrie is shipping about 75 cars per day to the Escanaba docks, en route to the Chicago Rolling Mills.—[Iron Spirit.

The ore season has now opened in Ashland. Over 5,000 tons have already been dumped into the Lake Shore docks, and Supt. M. Schrank has opened his office and began active work in filling the pockets. About forty cars were received this morning, and the busy scenes of Summer activity have begun. A small crew is already at work getting the ore into the pockets as it is received. The central docks are also ready for business and will put on two new ore trains Monday, and receive about fifty cars daily. The first ore will be dumped into the pockets on Monday. All three of the mammoth docks will be fitted up with electric lights, and the work continued as lively as possible from the beginning to the end of the season. An estimate has been made that, at least, 1,500,000 tons will be handled at the Ashland docks this year.—[Ashland (Wis.) Press.

Vermilion Range:—

The Chicago & Minnesota Ore Co. has filed articles in Springfield, Ill. Its capital stock is put at $2,000,000, and its purpose is mining, smelting, refining and transporting. C. P. Coffin, A. W. Grenville and A. C. Ellis are incorporators. C. P. Coffin is closely connected with H. H. Porter, President of the Duluth & Iron Range road, so the company is probably associated with the Minnesota and Exploration companies.

The Minnesota Iron Co. begins shipping ore to Two Harbors from the mines at once, and will get its first cargoes out by the 1st of May. This will be much earlier than ever before. "The Chicago fleet will start out April 20," said an officer of the big iron company this morning, "and I see no reason why we shouldn't get iron ore vessels at once thereafter. I am positive that cargoes will be on their way to Chicago and other parts before May 1st, and that will be considerably earlier than we have ever got cargoes out of the dock." Loading at the Tower mines has already begun and ore trains commence running next week. The delivery of new cars and locomotives is expected very soon. As lake shipments of the Minnesota and other Vermilion companies will be 30,000 tons weekly throughout the entire shipping season, it will be seen that the Iron Range road people will have their hands full and a season of tremendous activity is inaugurated.—[Duluth Herald.

Mahoning Valley Iron Men's Grievances.

No clearer statement of the grievances of the manufacturers of the Mahoning Valley can be presented than the following letter from J. H. Sheadle, secretary of the Mahoning Valley Iron Manufacturers' Association, to the *Iron Age:*

In the matter of coke rates, the present tariff on this commodity from the ovens toChicago, a distance of 528 miles,is $2.75 per ton, or 0.52 cent per ton per mile, while the rate to the furnaces in the Mahoning Valley is $1.35 per ton for a distance of 130 miles, or 1.04 cents per ton per mile.

The rate on ore from the lakes to the valley furnaces, a distance of 67 miles, is 72½ cents, or 1.07 cents per ton per mile, while the railroads haul this freight from the lakes to the Hocking Valley, a distance of, say, 170 miles, for 85 cents per ton, or 0.50 cents per ton per mile. Coal is another commodity in which we are greatly discriminated against in the matter of freight. The rates on coal to all points from the Pittsburgh district are made from Pittsburgh as the center of a 40-mile radius. The rate from this district to the valley, a distance of 65 miles, is 70 cents per ton, or 1.08 cents per ton per mile. The discrimination here lies in the fact that this coal is hauled over the same tracks through this valley to Cleveland, a total distance of, say, 132 miles, for 90 cents per ton, or 0.68 cent per ton per mile. In other words, coal is hauled from Youngstown to Cleveland, 67 miles, for 20 cents per ton additional to the rate paid on coal destined for Youngstown. These are some of the differences in freight charges on material entering into the manufacture of iron. Now, let us make some comparisons of pig iron tariffs.

The rate charged by Southern roads on pig iron from Birmingham to Cincinnati, a distance of 478 miles,is $2.75 per ton,or 0.57 cent per ton per mile, while from Youngstown to Philadelphia via Pennsylvania lines, a distance of 419 miles, the rate is $2.70, or 0.69 cent per ton per mile. Taking a short haul —for example, from Birmingham to Atlanta, a distance of 168 miles—the rate is $1.35 per ton, or 0.82 cent per ton per mile, while the rate from Youngstown to Marion, Ohio, a distance of 156 miles, is $1.40 per ton, or 0.90 cent per ton per mile.

Another Queer Ore-Carrier.

Readers of the IRON TRADE REVIEW,who recall a cut and description of the queer ore-carrying craft known as "101," will be interested in learning from the Duluth *Herald* that two similar vessels are being constructed at that city. The *Herald* says: "Just north of the framework built at the shipyard of the American Steel Barge Co. for the steel ship 102, ways are being constructed for the 103, the third vessel of the line. It will be of the same tonnage as the 102, but will be considerably unlike that in model. The new vessel will be shorter than the 102, but deeper, and a section of her hull amidships will more resemble that of an ocean freight carrier. It will have the same essential features that made the 101 the marine wonder, low rounding decks, no upper works, and a construction entirely of steel. It will not have the pointed snout-like ends of the 101, being built up forward and aft, more like a schooner. About 130 men are now at work at the yard, and when the work of building actually begins on the 103, this force will be doubled."

Steel Works at Duluth.

Manager W. H. H. Stowell, of the Duluth Iron & Steel Works, has returned to Duluth from a two months' business trip in the East. He has purchased all the appliances and material for the steel works, excepting the electric lights, and has been assisted in his purchases by the engineer of the works, Mr. Birkinbine, of Philadelphia. In Philadelphia they contracted for three hot blast stoves, which will cost about $50,000. A blowing engine, weighing 130 tons, and guaranteed to furnish 15,000 cubic feet of air a minute has also been bought. This machine is of the Weimar type. Material and mechanical appliances for an inclined plane, up which the coke, iron, etc., will be run in cars to be dumped into the melting furnace, and a furnace top and bell were also contracted for. The contracts for the 16 boilers has been let to the Iron Bay Manufacturing Co., of Marquette, and for the steam producer, gas and cold air connections to an Eastern firm. Orders for pumps and all other appliances were also given.—[Duluth Herald.

THE IRON TRADE REVIEW, of Cleveland, to which we have been indebted every week for a long time, for a resume of the iron ore and pig iron situation, has just put on a new dress and changed its make-up, and is, without question, the best exponent of the interests which it represents, that comes to our exchange table.—[Current, Norway, Mich.

THE Ohio Legislature has passed a bill fixing telephone rental at $3 per month, and $2.50 each for two.

FOREIGN COMMENT.

German Saws.

The saw-mills in the Italian Province of Belluno, numbering some 247, are supplied exclusively with German saw blades. They measure about 4 ft. 4 in. in length, by about 8 in. in width (1.32 metres by .21 metres), and cost with duty and carriage, about 8s. 9d. each. They are considered equal in quality to the English blades, and are certainly cheaper. The blades are toothed at the mills by a German machine.

An Iron Mine Under the Sea.

The iron mine at Diolette in the Department of La Manche, France, has been worked with energy in the past two years, and the results are encouraging. The quality of the ore is improved; traces of sulphur, which impeded its application to steel manufacture, tend to disappear. The chief difficulty of the mine is its position under the sea, which necessitates heavy expense in pumping arrangements to keep it drained. As a result of the activity in the mine, the port of Diolette is more frequented by small British vessels.

The Steel Rail Syndicate Dead.

All the efforts to reconcile the conflicting interest of the steel rail makers appear to have been abortive, and the project has come to an end, if our latest advices are to be relied upon. The views of the Continental makers were irreconcilable with those of our home manufacturers, and the latest conference has been adjourned *sine die*. There is no question in our mind but that the British manufacturer had nothing to gain by yielding to the rather grasping demands of the foreign competitors, and the experience of the last combination has made the efforts of the promoters of the proposed new one rather uphill work.—[Ironmongery.

An Industry America Might Have.

A correspondent, writing from New Orleans, says that of late years there has been a great decline in the market prices there of hoop iron. He ascribes this state of affairs to competition, which is so severe that it is only by doing a large amount of business that any appreciable returns can be realized. It is very satisfactory, however, to have to record that Great Britain is well able to hold her own in the trade, and is almost the only supplier of the imported article. The hoops arrive in packages, weighing, with the bands, about 50, or from that to 52, lbs. av. each, and consisting of 30 bundles.

The Manufacture of Aluminum and Its Alloys.

The Electro-Metallurgical Society is the title of a new company which has just been started at Forges, Department of Isere, France, for the production on a large scale of aluminum and its various alloys by what is known as the Heroult process. This process consists, in the first instance, of the fusion, by means of the electric current, of metallic alloys difficult of reduction, and subsequently in the separation by electrolysis of the metals contained therein. Two dynamos, each with a capacity of 7,000 amperes and 20 volts, in contact with a dynamo of 350 amperes and 65 volts, supply the current. The motive force is furnished by two vertical turbines of 300 horse-power.—Iron & Coal Trades Review.

Failure of the Proposed Tin-plate Syndicate.

We must congratulate the tin-plate makers upon their attitude toward the alleged American scheme for a Tin-Plate Syndicate. On Tuesday a very full conference was held at Swansea by the manufacturers, at which the promoters of the Syndicate, through a Mr. Fowler, who acted as their mouth-piece, propounded the details of the proposal. It was quite evident that they fell upon unsympathetic ears, and the proceedings concluded with the adoption, by 28 votes to 21, of a resolution declining "to entertain any scheme which would interfere with the absolute freedom under which the trade has been hitherto successfully conducted." A large number of manufacturers declined to vote, not wishing to take any part in the proceedings. It was felt, and rightly felt, by the trade that a Syndicate had no *raison d'etre* except with a view to an increase of prices, and that any increase at the present time, while such strenuous efforts are being made in the United States to establish the industry there, would be a suicidal policy.—[Ironmongery.

Condition of Clyde Ship-building.

The condition of the ship-building trade is very satisfactory, and not for years has the state of affairs been so good. During the month of March, 10 vessels—nine steamers and one sailing ship—measuring 15,030 tons, were launched from the Clyde ship-building yards, as compared with 16 vessels, aggregating 25,010 tons, last March, and 19 vessels of 24,000 tons in the corresponding month of 1887. The output in the past quarter comprised 26 vessels of 46,300 tons, as against 32 vessels of 43,296 tons in the first three months of last year, and 32 vessels, with a total of 45,770 tons in the corresponding period of 1887. The contracts booked during the month make up the respectable total of 40,000 tons, which is double the production. Since the new year the orders placed with Clyde builders represent a total of 34 vessels of 67,770 tons, whereas the vessels launched make up 51,578 tons, which is the largest for several years. The work on hand, at the present time, is about 293,000 tons. What makes the situation more gratifying is the fact that the masters and men seem to have come to an arrangement whereby future wages disputes will be amicably arranged—[Iron & Steel Trades Journal.

The "Modern Tower of Babel."

The London *Daily Telegraph's* correspondent at Paris, telegraphing, says: Flags are now waving from the summit of the Eiffel Tower, in token that it has attained its full height of 300 metres, and this afternoon a salute of 21 shots was fired from the look-out, on the top, in honor of the event. The lift is expected to be installed and in working order by April 20, so, in the course of a few weeks from this date, the public will be able to enjoy the marvelous view which is to be obtained from this modern Tower of Babel. M. Eiffel is certainly to be congratulated on the result of his plucky undertaking, for his tower has risen foot by foot without the slightest hitch, completely demonstrating the correctness of his calculations. It is a wonderful piece of engineering, and, now that it is finished, the whole thing looks so simple that it seems surprising that such an attempt was never made before. Yet the amount of study required in placing the construction of the loftiest monument ever erected by man, must have been enormous. As it is, M. Eiffel's enterprise has now won unstinted praise, even from those who, at the outset, most severely criticised the scheme. The tower will be the prominent feature—in more senses than one—of an exhibition rich in countless marvels.

Progress of Protection Abroad.

Finland is apparently going to follow the example of Sweden in trying to encourage home industries, and, as a commencement, an order for twelve locomotives for the Karelska and Bjorneborg has been entrusted to the Stenberg engineering works, at Helsingfors. Finland is altogether a country which is begining to wake up. Within the last few years important advancements and extensions of various industries have been carried out. The manufacture of agricultural machinery and implements has, for instance, been pushed by several makers, the natural effect being a considerable reduction of imports from abroad.

In Denmark the question of a revision of the tarriff is very much to the front, and a number of public meetings have been held to discuss the matter. The passing of a completely new tariff is hardly probable at present, owing to the strained relations between the government and the lower house. Smaller modifications may, however, be adopted, and, judging from a statement made by the Minister of Finance recently, such alterations are pretty sure to be somewhat Protectionist in their tendency. Danish manufacturers very keenly feel the effects of German competition.

The Value of Metals.

If the wealth of the Vanderbilts be not over-stated it amounts to nearly $200,000,000. With this sum they could purchase 312 tons of gold, and have something left over, but they couldn't buy two tons of gallium, that rare metal being worth $3,250 an ounce. With this metal the highest price is reached. Gold is worth about $240 per troy pound, platinum $130, and silver about $12. Nickel would be quoted at about 60 cents, and pure aluminum $8 or $9 to the troy pound.

Now, compare these prices with those of the rarer and less well-known of the metals. To take them in alphabetical order, barium sells for $975 a pound, when it is sold at all, and calcium is worth $1,800 a pound. Cerium is a shade higher—its cost is $160 an ounce, or $1,920 a pound. Chromium brings $200, while didymium is the same price as cerium, and erbium $10 cheaper on the ounce than calcium, or just $1,680 per pound. Glucinum is worth $250 per ounce; indium, $158; iridium, $658 a pound; lanthanium, $175; and lithium, $160 per ounce. Niobium costs $128 per ounce; osmium, palladium, platinum, potassium, and rhodium bring, respectively, $640, $400, $130, $32, and $512 per pound. Strontium costs $128 an ounce; tantalum, $144; tellurium, $9; thorium, $272; vanadium, $320; yttrium, $144, and zirconium, $250 an ounce.

Thus we see that the commonly received opinion as to what are the most precious metals is quite erroneous. Barium is more than four times as valuable as gold, and gallium more than 162 times as costly, while many of the metals are twice and thrice as valuable. Aluminum, which now costs $8 or $9 a pound, will eventually be produced as cheaply as steel. Its sources of supply are inexhaustible, and its present high cost arises from the difficulty of its extraction in a metallic form. Many of the metals mentioned have but a limited sphere of usefulness.—[Exchange.

Tube Works Sold.

The Warren Tube Co.'s plant was sold by Sheriff McKinley April 13 to O. C. Barber, the match manufacturer of Akron, for $35,300. Several efforts had been made during the last two or three months by the Sheriff to dispose of the property, but the appraisement was always higher than bidders were willing to approach. The last appraisement was $30,000. The bidding continued for two hours. A large crowd of men were present, including several from this city. It is thought that Mr. Barber represented in the purchase the majority of the original stockholders, and the works are now practically in the hands of the builders who erected them at a cost of $150,000. The new company will resume work soon.—Youngstown (O.) Telegram.

WE desire hereby to commend a new work by A. R. Foote, entitled "Economic Value of Electric Light and Power" (Robert Clarke & Co., Cincinnati). This book, the author says, is intended to be of use to those who are interested in obtaining State or municipal legislation for electric service, those who desire to increase the facilities of electric central stations, and to manufacturers to assist them in opening new fields for the uses of electric apparatus. Mr. Foote gives plain but complete descriptions of the various modes of developing and using electricity, and in his work he presents the results of the latest efforts in this new field.

THE consumers of pig iron in the West Russian Vistula district have formed a syndicate for the purpose of checking the extortionate demands of the producers.

BUSINESS MEN'S FUN.

NO CHANGE.

Mrs. Blobson—Is there any change in your pockets this morning, my dear?

Mr. Blobson—None at all, my love. They are just as they were yesterday, thank you.—[Burlington Free Press.

WHY WOMEN MAKE POOR ENGINEERS.

Blobson—"Ha, ha! Here's an article which says that before the close of the nineteenth century we shall see women running locomotive engines on our railroads.,"

Mrs. Blobson—"Well, why not? Don't you think they would make good ones?"

Mr. Blobson—"In some respects, perhaps. They would keep a good look-out ahead, anyway."

Mrs. Blobson—"Why so?"

Mr. Blobson—"Because they would have their heads out of the cab window all the time to show their new bonnets."—[Burlington Free Press.

SOMETHING NEW IN NAIL-MAKING.

A *bon mot* by one of the veterans in the Eastern cut-nail trade is being widely quoted. At one of the recent meetings of the manufacturers the delicate question of distributing allotment was being discussed. One of the younger manufacturers, who is described as a progressive and energetic though somewhat impetuous man, in pressing his claims for a larger percentage dwelt upon his ability to produce cheaply. After imparting to his colleagues that he was using skelp strap, costing 1 cent a pound, as a raw material, he was about to leave the conference when the chairman quietly suggested that in his long experience as a nail-maker this was the first case in which he had known a skelp mill to be run to furnish raw material for cut-nail manufacture. The skelp-scrap nail-maker stopped to explain and the impending rupture was averted.—[Iron Age.

A SKILLED MECHANIC.

No one more than the stone mason appreciates the value of the hod-carrier, unless it is the hod-carrier himself. The other day a Boswell avenue woman, who wanted a pile of gravel removed, saw the hod-carrier serving the masons who were repairing the chimney of her house spending considerable time in waiting, so she went out and said to him:

"I would like to hire you to shovel up a small pile of gravel for me, while you are standing 'round here."

"Mad dam!" responded Pat, eyeing the woman sharply, "Ye hev maid a mistake! I am as phoine a mechanic as any one av thim min on th' house-torp. Widdout me they could not make the shimney. I duz not sile me hans shuvlin gravel for the best wooman in the counthry. If yer needs such meneale wurrik dun, ye shud go and git a common labirer to do it! Begarro! I lacks both the time and the dispersition to do it for yer!"—[Norwich Bulletin.

GOOD ENOUGH FOR A PASS.

"You have often heard of the case, I suppose," said a railroad man, "where a magnate wrote to a farmer to move his barn off railroad land, and the writing was so poor that no one could read it, and the farmer used the order for a pass, the signature being recognized by conductors. I do not know how true that story is, but I will tell you of a similar instance, the truth of which I will swear to. When Judge Grinnell was receiver of the Iowa Central road a man wrote to him for a pass, stating no reasons why he should have one. The judge became indignant and personally wrote to the applicant giving him a mild roasting. No one could make out what the letter meant, but with the judge's signature attached it was considered as an annual pass, and was used as such for nearly nine months. I have seen the letter myself."—[Burlington Hawkeye.

THE PLUMBER'S LAMENT.

"If people don't quit asking me where I am going to spend the Summer, there will be murder committed," ejaculated an irate plumber, as he beat a sad refrain on his desk with his knuckles. "I am getting tired of these jokes about plumbers' diamonds, fast horses and trips to Europe. They are utterly senseless. There are probably 125 master plumbers in St. Louis, and none of them are millionaires, by a long shot. What's more, you can count those that are worth $50,000 on your fingers. That shows how much money there is in the plumbing business. Like the rest of my hard worked class, I will stay at home this Summer and try to make both ends meet. Why a measly imbecile came in here a moment ago, and pointing out my office boy, asked if that was the workman whose services I charged $6 a day for. Then he laughed—just think of it," in a tone of deep disgust, "at his own idiotic joke. It's high time for the newspaper paragraphers to bury the plumber likethey did the mother-in-law."

Speculating in Pig Iron.

Glasgow is not only the great center of the world's pig iron market, but also the emporium of speculation in this valuable ore; and we are informed, by parties in the trade, that at times the speculative excitement, in Scotch warrants, reminds one of wheat speculation in Chicago. Just now an important deal is being manipulated by a Glasgow firm, which is well known in this city, and consequently a good deal of interest is manifested in it by parties here, who, for aught we know, may have a finger in the pie. Be that as it may, prices have been hoisted in a steady and determined manner to 45s. at time of writing, which is an advance from bedrock of about 7s., and according to recent advices from the great commercial center of Scotland, they are likely to be urged on to a still higher destiny. The figure heads of the present movement, who are backed by a respectable gathering of the ferruginous clans, were in high glee when the last mail left Glasgow, since which time values have been lifted to a higher altitude, and large sums have been mentioned as the probable profits of those who engineered this "bull" movement. It is significantly hinted, however, that after the realization process has been performed by the leaders, some one may get left and hurt. In spite of the sharp advance in the price of warrants in Glasgow, sales of leading Scotch brands of pig iron for Spring delivery have been made by Montreal firms at $21.00 to $21.50 usual terms, 100 tons of a well-known leading brand being placed for Spring delivery at $20.50 net cash and another lot at $20.75 net cash.—[Montreal Trade Bulletin.

THE Cleveland (O.) IRON TRADE REVIEW has been entirely rehabilitated, and is now one of the handsomest class journals in America.—[Chattanooga Tradesman.

GEORGE WASHINGTON'S INAUGURATION.

Excursions to New York via the Pennsylvania Short Lines for the Centennial Celebration.

Excursion tickets to New York City at very low round trip rates will be sold from all principal stations on the Pennsylvania Lines west of Pittsburgh, for the Centennial celebration of the inauguration of George Washington, to be held April 29th and 30th, 1889. This celebration is in the hands of well known and enterprising citizens of New York, who promise that it shall be a most picturesque and magnificent carnival. For complete information regarding rates of fare and train accommodations for individuals or organized bodies apply to the nearest passenger or ticket agent of the Pennsylvania Lines.

LIST OF PATENTS.

Relating to Iron, Steel, Metal, Machinery, Hardware and Mining Interests.

Reported expressly for this paper by H. T. Fisher, (late Ex. U. S. Patent Office), Patent Attorney, 34 Blackstone Building, Cleveland, O.

PATENTS BEARING DATE APRIL 9, 1889.

Bars or rounds of steel or iron, manufacture of, S. McCloud, Chicago, Ill.
Blast furnaces, flux-feeding apparatus for, N. A. Pratt, Atlanta, Ga.
Casting straps, core for, J. Z. Gifford, New Bedford, Mass.
Copper from copper pyrites, extracting, J. Perion, Charlottenburg, near Berlin, Germany.
Gearing, driving, J. C. Whitford, Stockton, Cal.
Gearing, frictional, G. F. Evans, Somerville, Mass.
Metallic mat, A. M. Reeves, Indianapolis, Ind.
Ore crusher and metal separator, J. C. Wiswell, Medford, Mass.
Ore roaster, C. J. Fendel, Anaconda, Montana Ter.
Stamping sheet metal, roller die for, L. L. Sagendorph, Cincinnati, O.
Steel balls, machine for making, W. H. Wright, Buffalo, N. Y.
Steel, toughening forged articles of, J. Coffin, Johnstown, Pa.
Tubing, apparatus for the manufacture of metal, J. H. Flagler, New York, N. Y.
Tubing, forming seamless, J. H. Flagler, New York, N. Y.
Zinc furnace, G. M. Westman, New York, N. Y.

EXPIRING PATENTS.

Relating to the Mechanic Arts. Which Become Public Property April 23, 1889.

Furnished by F. B. Brock, Patent Attorney, 639 F St., Washington, D. C.:

Ice elevator, L. Townsend.
Furnace for pudling and boiling, A. & J. Reese.
Device for lining cement pipes, M. Stephens.
Riveting device, T. J. Allison.
Screw cutting device, S. North.
Wrench, H. G. Brown.
Soldering tool, McMurray & Hollingsworth.
Printing telegraph, R. H. Gallaher.
Pipe tongs, J. F. Brewer.
Rotary pump, G. S. Tollensbee.
Cylinders for steam hammers, T. R. Morgan.

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STATIONERY, Neat, stylish and business-like.

STOCK CERTIFICATES, Elegant and "taking" in design.

BLANK BOOKS, Substantial and ruled to order.

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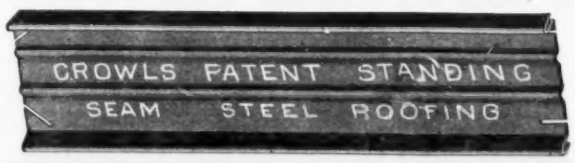

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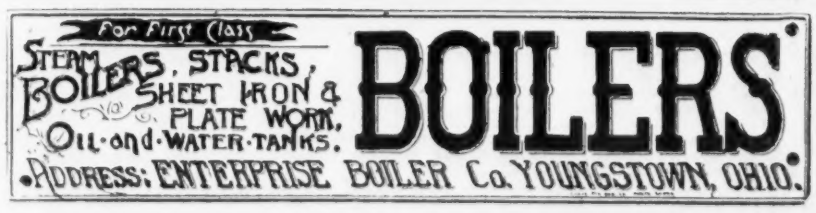
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IRON AND STEEL MARKETS.

PIG IRON.

CLEVELAND (f. o. b. cars, four months): No. 1 Bessemer, $18 00@18 50; No. 1 Foundry, $17 20@17 70; No. 2 Foundry, $16 20@16 70; No. 1 Gray Forge, red short, $15 20@15 70; No. 2 Gray Forge, neutral, $14 70@15 20; No. 1 American Scotch, $17 20@17 70; No. 2 American Scotch, $16 20@16 70.

CINCINNATI (reported by Rogers, Brown & Co.): HOT BLAST FOUNDRY—Ohio and Southern Coke No. 1, $15 00@15 50; Ohio and Southern Coke No. 2, $14 25@14 75; Ohio and Southern Coke No. 3, $13 50@14 00; Ohio Soft Stone Coal No. 1, $15 75@16 50; Ohio Soft Stone Coal No. 2, $14 75@15 50; Mahoning and Shenango Valley, $16 50@17 00; Hanging Rock Charcoal No. 1, $21 00@22 50; Hanging Rock Charcoal No. 2, $19 00@22 50; Tennessee and Alabamba Charcoal No. 1, $18 00@18 50; Tennessee and Alabama Charcoal No. 2, $17 00@18 00. FORGE—Strong Neutral Coke, $13 00@13 50; Mottled Neutral Coke, $12 50@13 00; Cold Short Coke, $13 00@13 50. CAR WHEEL AND MALLEABLE—Southern Car Wheel, $20 00@25 00; Hanging Rock Cold Blast, $22 00@25 00; Lake Superior Malleable and Car Wheel, $21 00@21 50.

CHICAGO (reported by Rogers, Brown & Co.): COKE AND BITUMINOUS COAL FOUNDRY—Ohio (Hanging Rock Softeners) No. 1, $18 00@18 50; Ohio (Hanging Rock Softeners) No. 2, $17 00@17 50; Ohio (Hocking Valley Softeners) No. 1, $18 00@18 50; Ohio (Hocking Valley Softeners) No. 2, $17 00@17 50; Ohio Hocking Valley Silvery Pure No. 1, $17 00@00 00; Ohio Hocking Valley Silvery Pure No. 2, $16 00@00 00; Ohio (Black Band), $19 00@19 50; Ohio Jackson County Softeners No. 1, $18 00@18 50; Norton and Ashland Brands (Ashland, Ky.) No. 1, $17 00@17 50; No. 2, $16 00@$16 50; Southern Coke Foundry No. 1, $16 50@17 00; Southern Coke Foundry No. 2, $15 75@16 25; Southern Coke Foundry No. 3, $15 25@15 75; Southern Coke, Soft No. 1, $15 75@16 25; Southern Coke, Soft No. 2, $14 50@15 00; Southern Coke, Grey Forge, $14 50@15 00; Local Furnaces at Chicago and Milwaukee No. 1 Foundry, $16 00@17 00; No. 2 Foundry, $15 00@16 00; No. 3 Foundry, $14 00@15 00. CHARCOAL FOUNDRY—Lake Superior No. 1 and 2, $20 00@00 00; Hanging Rock, $21 00@23 50; Southern, $19 50@20 50. CAR WHEEL AND MALLEABLE—Standard Southern No. 3 to 6, $20 50@25 50; Lake Superior, $20 50@21 00; Hanging Rock Cold Blast, $24 50@27 00; Hanging Rock Warm Blast, $22 00@24 00.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry (new classification), $14 75@15 25; Southern Coke No. 2 Foundry (new classification), $14 25@14 75; Southern Coke No. 3 Foundry (new classification), $13 75@14 25; Grey Forge, $13 25@13 75; White and Mottled, different grades, $12 75@13 25; Silver Grey, different grades, $13 00@13 50; Southern Charcoal No. 1 Foundry, $16 25@16 75; Southern Charcoal No. 1 Mill, $14 75@15 25; Southern Car Wheel, Standard brands, $21 75@22 75; Southern Car Wheel, other brands, $18 00@19 50; Hanging Rock Coke No. 1 Foundry, $15 50@16 00; Hanging Rock Charcoal No. 1 Foundry, $19 50@21 00; Hanging Rock Cold Blast, $20 75@23 75; Hanging Rock Warm Blast, $00 00@00 00.

ST. LOUIS (reported by Rogers, Meacham & Shields): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 50@16 25; Southern Coke No. 2, $15 00@15 50; Southern Coke No. 3, $14 50@15 00; Southern Grey Forge, $13 50@14 00; Southern Charcoal No. 1, $18 00@18 50; Southern Charcoal No. 2, $17 00@18 00; Missouri Charcoal No. 1, $16 00@16 50; Missouri Charcoal No. 2, $15 00@16 00; Ohio Softeners, $17 00@19 00. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $20 00@22 00; Southern, $19 00@24 00. CONNELLSVILLE COKE—East St. Louis, $4 55; St. Louis, $4 70.

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $19 50@20 00; Lake Superior Coke, all Ore, $18 50@19 00; Lake Superior Coke, Cinder Mixed, $17 75@18 25; Standard Ohio Black Band, $18 50@19 00; Southern No. 1, $17 00@17 50; Southern Gray Forge, $15 00@15 50; Southern Silvery, $16 50@17 00; Jackson County (Ohio) Silvery, $18 25@18 75; Old Wheels, $18 50@19 00.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $16 25@16 50; No. 2 Foundry, $15 25@15 50; Gray Forge, $14 25@14 50; White and Mottled, $13 75@14 00; Warm Blast Charcoal, $18 00@21 00; Cold Blast Charcoal, $22 00@25 00; Bessemer, $16 50@17 00.

MERCHANT IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 70
4¼ to 6 by ⅜ to 1 inch	1 80
1¾ to 6 by 1⅛ to 2 inch	2 10
1¼ & 1⅜ by ⅜ to ¾ inch	1 80
1 & 1⅛ by ⅜ to ¾ inch	1 80
⅝, ¾ and ⅞ by ⅜ to ⅝ inch	2 20

Round and Square.

1 to 1⅞ inch	1 70
2 to 2⅝ inch	1 90
2¾ to 3¼ inch	2 20
3⅜ to 4 inch	2 70
4¼ to 4½ inch	3 20
4¾ to 5 inch	3 40

Oval.

⅞ to 1¼ inch	2 10
⅝ to ¾ inch	2 30
½	2 50
⅜	2 90

Half Oval and Half Round.

1½ to 3 inch	2 80
⅞ to 1¼ inch	2 40
⅝ to ¾ inch	2 90
½	3 20
⅜	4 70

Heavy Band.

⅛ to 6 by ¼ and 5-16 inch	1 95
1 to 1⅜ by ¼ and 5-16 inch	2 05
¾ to ⅞ by ¼ and 5-16 inch	2 25
½ to ⅝ by ¼ and 5-16 inch	2 75

Hoops.

1¼ to 4, Nos. 13 to 15	2 55
1¼ to 2, Nos. 16 to 18	2 65
1¼ to 2, No. 19	2 75
1¼ to 2, No. 20	2 85
1¼ to 2, No. 21	2 95
1¼ to 2, No. 22	3 05
15-16, 1 and 1⅛, Nos. 13 to 15	2 75
15-16, 1 and 1⅛, Nos. 16 to 18	2 85
15-16, 1 and 1⅛, Nos. 19 and 20	2 95
15-16, 1 and 1⅛, No. 21	3 05
15-16, 1 and 1⅛, No. 22	3 25
⅞, Nos. 13 to 15	2 95
⅞, Nos. 16 to 18	2 05
⅞, Nos. 19 and 20	2 15
⅞, No. 21	3 25
⅞, No. 22	3 35
13-16, Nos. 13 to 15	3 15
13-16, Nos. 16 to 18	3 25
13-16, Nos. 19 and 20	3 35
13-16, No. 21	3 45
13-16, No. 22	3 55
¾, Nos. 13 to 15	3 25
¾, Nos. 16 to 18	3 35
¾, Nos. 19 and 20	3 45
¾, No. 21	3 55
¾, No. 22	3 65
11-16, Nos. 13 to 15	3 45
11-16, Nos. 16 to 18	3 55
11-16, Nos. 19 and 20	3 65
11-16, No. 21	3 75
11-16, No. 22	3 85
⅝, Nos. 13 to 15	3 85
⅝, Nos 16 to 18	3 75
⅝, Nos. 19 and 20	3 95
⅝, No. 21	4 05
⅝, No. 22	4 15
⅝, No. 23	4 25

Light Band.

1½ to 6 by ⅛ to 3-16 in	2 25
1½ to 6 by Nos. 11 and 12	2 35
1 to 1⅜ by ⅛ to 3-16 in	2 35
1 to 1⅜ by Nos. 11 and 12	2 45
⅞ and 13-16 by ⅛ to 3-16 in	2 65
⅞ and 13-16 by Nos. 11 and 12	2 75
¾ and 11-16 by ⅛ to 3-16 in	2 95
¾ and 11-16 by Nos. 11 and 12	3 05
⅝ and 9-16 by ⅛ to 3-16 in.	3 25
⅝ and 9-16 by Nos. 11 and 12	3 30
½ by ⅛ to 3-16 in	3 50
½ by Nos. 11 and 12	3 60

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	2 75
⅞ inch, " " " 13 and 14	3 05
¾ inch, " " " 11 and 12	3 05
¾ inch, " " " 13 and 14	3 25

Sheet Iron.

No. 10 to 14	2 45
No. 15 to 17	2 65
No. 18 to 21	2 75
No. 22 to 24	2 85
No. 25 to 26	2 95
No. 27	3 05
No. 28	3 25

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 35
C No. 1, " "	2 60
C H No. 1 " "	2 85
C H Flange, " "	3 55
Extra Flange, "	3 95
Solid Fire Box, "	4 85

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 55
Shell	2 95
Flange	3 20
Marine Flange	3 70
Fire Box	4 35

Above includes plates 90 inches wide.

90 to 96 in. wide	½c lb extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1½c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	09
9-16 to ½ in "	09
7-16 to ⅜ and 2⅜ to 3 in	10½
3⅛ to 4 in	11
⅝ to 11-16 and 4⅛	10½
⅛ to 6 in	11½
¼ to 9-32 and 6⅛ to 7 in	12
3-6 in	14

Flats.

	cts. lbs
2 to 9-16 wide by 2 to ⅝ thick	0

Bessemer and O. H. Steel.

	ct. lb
Machinery	base price, 02¾
Tire	" 02¾
Spring	" 03¼
Sleigh Shoe	" 02¾
Toe Calk	" 03
Cutter Shoes, tapered and burr.	" 03

English Tool Steel.

Jessop's	16c
Hobson's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	4 00
Bridge ½, ⅝, 11-16 and ¾ inch diam	4 00

SCRAP IRON AND OLD METAL.

	Net Ton.
No. 1 R. R. wrought scrap	$18 50
No. 1 wrought scrap	17 50
No. 1 Machine cast scrap	13 50
Stove Plate (free from burnt iron)	10 00
Grate Bars	8 50
Pipes and flues (Clean)	13 00
Tank iron	12 50
Hoop and band iron	10 00
Iron axles	24 00
Light sheet iron	10 00
Axle turnings	14 00
Wrought turning (free from cast)	12 50
Wrought iron, oily drillings	11 00
Cast borings	10 00
Malleable iron	11 50
Uncut wrought iron boilers	10 00
Steel boiler plates	14 50
Old iron T rails, gross tons	22 00
Old steel rails	18 50
Car wheels	20 00
Old copper, ₰ lb	10
No. 1 H. red Brass	11
Heavy yellow brass	8½
Light yellow brass	6
Scrap Zinc	3
Tea Lead	3
Heavy Lead	3¼

PITTSBURGH & WHEELING COAL CO.,
MINERS AND SHIPPERS OF
Ohio Steam Coal and Coke.
Mines on the Cleveland, Lorain & Wheeling R. R. Capacity, 3,000 tons daily.
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Blooms and Billets, Steel Angles, Forgings, Bar and Spring Steel, Steel Street Rails, Steel Oil Barrel Hoops, Wire of all Kinds, Iron and Steel Boiler Plates, Galvanized and Black Sheet Iron, Corrugated Iron Roofing, Sheet Steel.

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CORRUGATED ROOFING.
Galvanized Iron. Patented Leveled Sheet.
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Send for catalogue with new designs or Arabesque Radiators for Oriental, Moorish and other Queen Anne rooms.
A. A. GRIFFING IRON COMPANY,
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Good Second-Hand Engines, Boilers and other Machinery, Plates and Castings, suitable for use in a Rolling Mill. Give dimensions, condition, etc., in detail, with bottom prices on cars for cash. Address, P. O. BOX 323, Cincinnati, O.

The Kilby Manufacturing Co.,
CLEVELAND, O.,
SUCCESSORS TO
The Prospect Machine & Engine Co., of Cleveland, O., and Barney & Kilby, of Sandusky, O.
Recent extensive additions to our shops and Machinery makes our Plant one of the largest and best equipped in the country.
We are now prepared and have facilities for doing Foundry and Machinist work of every description. Shall be glad to furnish estimates on application for Engines, Boilers and other heavy Machinery.

CONDIT, FULLER & CO.,
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EXCLUSIVELY PIG IRON,
Strong Foundry and American Scotch Irons, Gray Forge and Bessemer Irons for steel purposes.
Room 57, Grand Arcade, Cleveland, O.

TUTTLE, OGLEBAY & CO.,
Commission Dealers in
Iron - Ores,
FROM MARQUETTE, GOGEBIC AND MENOMINEE DISTRICTS,
CLEVELAND, OHIO.

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IRON ORE - -
—AND—
- - PIG IRON
Corner Bank and Superior Streets,
CLEVELAND, O.

J. H. OUTHWAITE. W. G. POLLOCK.
J. H. OUTHWAITE & CO.,
Exclusive attention given to
LAKE SUPERIOR AND MENOMINEE RANGE
Iron Ore,
CLEVELAND, OHIO.

MACHINERY SUPPLY MARKET.

Anvils.

American ..... ℔ lb 9@10
Wrights ..... ℔ lb 9½

Bellows.

Blacksmiths' { Hill's ..... dis 40 / Bullock's .... dis 50&10
Moulders' ..... dis 40@40&10
Hand ..... dis 40&10@50

Belting.

Boston Belting Co's standard ..... dis 70@70& 5
" " " extra ..... dis 60&5@60&10
" " " best ..... dis 55
Hoyt's Short Lap ..... dis 45
Cleveland Rubber Co. extra standard dis 60&10
Shultz Raw Hide Leather Belting, single, ... dis 30
Shultz Raw Hide Leather Belting, double, ... dis 35
Standard, oak tanned ..... dis 55@60
Alexander Brothers' pure oak tanned. ... dis 45

Blowers and Exhausters.

B. F. Sturtevant's ..... dis 20
Boston Blower Co. ..... dis 35
Buffalo ..... dis 35

Borax.

..... ℔ lb 9½@10½

Chalk.

White ..... ℔ gross 50
White Crayon ..... ℔ gross 12@12½ dis 10
Red ..... dis 70
Blue ..... dis 85

Chucks.

Cushman's 4 Jaw Independent ..... dis 40
" Combination ..... dis 40
" Geared Scroll ..... dis 30
" 2 Jaw Brass Workers ..... dis 25
" Drill ..... dis 35
Wescott's Scroll Combination ..... dis 30
" Independent ..... dis 40
" Little Grant Drill ..... dis 30
Horton's Universal & Ind ..... dis 40
National Combination ..... dis 40
Sweetland " ..... dis 40
Skinner " ..... dis 40
" Light Independent ..... dis 50
Almond Drill ..... dis 25
Morse " ..... dis 15

Cutters and Reamers.

Cleveland ..... dis 10@15
Pratt & Whitney ..... dis 10@15
Standard ..... dis 10@15
Brown & Sharpe, Milling Cutters ..... dis 15
" " Gear Cutters ..... dis 15

Crowbars.

Cast Steel ..... ℔ lb 4
Iron, steel points ..... ℔ lb 3½

Drill and Drill Stocks.

Twist drills ..... dis 50&10
Morse Taper and Straight shank to 1½" ..... dis 50&10
Morse Taper and Straight shank Larger than 1½" ..... dis 25
Drill Sockets ..... dis 20
Standard ..... dis 50&10
Cleveland ..... dis 50&10

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. FF.
Kegs, ℔ lb	4 c	5 c		2½c
½ kegs ℔ lb	4¼c	5¼c		2¾c
¼ kegs ℔ lb	4½c	5½c		3 c
10 lb cans, 10 in case	6 c	6½c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co. ..... dis 40@46
H. H. Barton ..... dis 40@46

Emery Wheels.

Detroit ..... dis 50@60
Norton's ..... dis 55@60
Grant ..... dis 55@60
Union Stone ..... dis 60
Sterling ..... dis 60
Vulcanite ..... dis 15@20
Celluloid ..... dis 10
Northampton ..... dis 55
Crystal ..... dis 65@70
Vitrified ..... dis 60

Files.

Nicholson ..... dis 60&10@60&10&10
" X. F. ..... dis 25
Kearney & Foot ..... dis 60&10@60&10&10
Black Diamond ..... dis 60&10@60&10&10
Arcade ..... dis 65@70
Disston's ..... dis 65@70
Western ..... dis 70
Stub's ..... dis 25
Grobet's ..... dis 30
Reynolds Bros.' Hand Cut ..... dis 50

Hammers.

P. S. W. ..... dis 40
Atha new list, Jan. 15, 1887 ..... dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list ..... dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¾	4	3¼	3½
Hexagon	15½	11½	8½	6	5¾	5¼	5
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ℔ lb add ½c., 1lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887 ..... dis 70 &10
Standard Penny Nails, ℔ keg card rate
{ Car lots $2.50
{ Less than car lots $2.60

Oilers.

Zinc and Tin ..... dis 60
Brass and Copper ..... dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ℔ doz ..... dis 10@10&10

Packing, Steam.

Boston Belting Co. ..... dis 60
American Packing Hemp ..... ℔ lb 10@11
Russia Packing " ..... ℔ lb 14
Italian Packing " ..... ℔ lb 13@14
Plumbago Piston ..... ℔ lb 40
Morrison's " ..... ℔ lb 50
Square Flax " ..... ℔ lb 70
Sheet Rubber ..... ℔ lb 12@24
Excelsior Rubber ..... ℔ lb 48

Picks.

Railroads, 5 to 6 lbs ..... $12 dis 60&5@60&10
" 6 to 7 lbs ..... $13 dis 60&5@60&10

Pulleys.

Iron Pulleys, Walker List ..... dis 45
Medart Pulleys ..... dis 55
Split Wood Pulleys ..... dis 45

Rivets.

Iron, Thousand, list November 17, ... dis 50@50&10
Iron, Ordinary, Cooper's Block and Carriage list November 17 ..... dis 50
Copper ..... dis 50@50&10

Rope.

Manilla, ½ inch and over ..... ℔ lb 15¼
Sisal, ½ inch and over ..... ℔ lb 13¾

Sand Paper.

B. A. & Co. ..... dis 40@40&10
H. H. Barton's ..... dis 40@40&10
New England Flint ..... dis 40@40&10
Barton's Garnet ..... dis 20

Saws.

Disston's Circular ..... dis 45
" Band ..... dis 20
" Scroll ..... Net
Hack Saw Stubs ..... dis 20
" " Eureka ..... dis 20
" " Star ..... dis 20
Saw Swages Disston's ..... dis 20
Atkins' Cicular Saws ..... dis 50
" Mill, Mulay and Drag Saws .. dis 40&10
" Wood Saws ..... dis 40&10
" Silver Steel Diamond Cross-cut Saws ..... dis 70c per ft
" Dexter Cross-cuts ..... dis 50c "
" Diamond " ..... dis 30c "
" Tuttle Tooth Cross-cuts .. dis 25c "
" One-man Cross-cuts ..... dis 32c "
No. 1 Handles ..... dis 23c per pair
No. 6 " ..... dis 16c "
Excelsior Saw Tools ..... $6 per doz
Perfection " ..... $15 "

Screws.

Wood Screws—List Jan 27, 1889.
Flat head iron ..... dis 50
Round head iron ..... dis 40
Flat head brass ..... dis 45
Round head brass ..... dis 35
Square Cap ..... dis 65
Hexagon Cap ..... dis 60
Set C. H. C. P. ..... dis 70
Machine, flat head, iron ..... dis 55
Machine, round head, iron ..... dis 50
Bench and hand—
Lag or coach ..... dis 75@75&10
Coach, patent gimlet point ..... dis 75

Shovels and Spades.

Ames' list November 1, 1885 ..... dis 20
Dennis ..... dis 5.25
Hussey & Binns, railroad ..... dis 8.00

Taps.

Cards, Hand and Nut to 2 in ..... dis 50
Carpenters' " " " ..... dis 50
Morse " " " ..... dis 50
Pratt & Whitney " " ..... dis 25
Machine Screw Taps ..... dis 55
Pipe Taps to 2½ in ..... dis 70
Stay Bolt Taps ..... dis 25
Stove Bolt Taps ..... dis 50
Pulley Taps ..... dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ½ lb Balls		21c@29c
No. 18 " " ¼ and ½ "		18c@28c
No. 36 " " ¼ and ½ "		16c@27c
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine)		11½c
3-Ply " 1lb Balls		12@12¼c
3-Ply " 1½ lb Balls		11@11¼c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box ..... dis 60
Parker's ..... dis 20@25
Prentiss ..... dis 20
Stephen's ..... dis 25@30
Barrett's ..... dis 30
Miller's Falls ..... dis 40
Merrill's ..... dis 10@15
Howard ..... dis 30

Wire.

New List, Jan. 18, 1884

Brass and copper ..... dis 20@25
Bright and annealed, Nos. 0@18 ... dis 70&10@75
" " Nos. 19@26 .. dis 75@75& 5
" " Nos. 27@36 .. dis 75&10& 5
Coppered Nos. 0 to 18, market list .. dis 70@70& 5
Galvanized Nos. 0 to 18 " " ..... dis 65&5
Tinned market Nos. 0 to 18 ..... dis 67½
Cast steel ..... dis 50
Tinned Broom Wire ..... dis 70&5@70&10
Annealed Fence, Nos. 8 and 9 ..... dis 75
Annealed Grape, Nos. 10 to 14 ..... dis 75
Stub's Steel Wire regular ..... $6.00@lb dis 30

Wrenches.

Coe's genuine, cash in ten days ..... dis 50
Girard Standard ..... dis 70&10
Agricultural ..... dis 75&10
Mechanics' ..... dis 55&10,& 3
Bemis & Call's Combination ..... dis 35
Donohue's Engineers ..... dis 20&10
Lamson & Sessions Engineers ..... dis 60
Billings & Spencer's Drop Forged ..... dis 10
William's " " ..... dis 10
Alligator " " ..... dis 40

EUCHENHOFER'S
Patent Automatic Feeder
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BOILER SCALE SOLVENTS.

Feeds regularly and automatically, so as to keep the water in boiler constantly impregnated with whatever solvent is used. Most effective in the market. Address the manufacturers,

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The only genuine Allen's Black Lead Compound Babbitt. Perfect satisfaction guaranteed. The cheapest metal made, quality considered. Address all orders to
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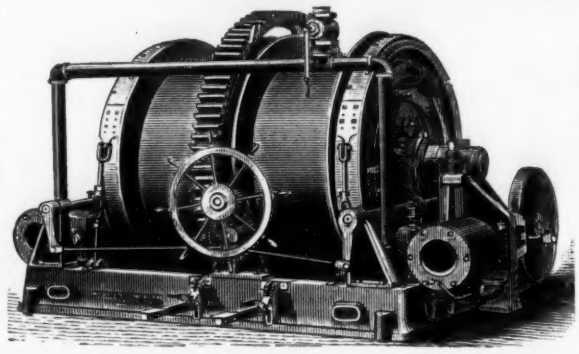

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Improved Band Friction Hoisting Machinery, Geared or Direct Acting, for round or flat rope.
Wire Rope Haulage Machinery,
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Automatic or Slide Valve Steam Engines, Sheaves, Cages, Buckets, Etc.
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Lubricator for Traction, Portable and all other small Engines, pumps, etc. Single connection.

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STEAM SIGHT FEED LUBRICATOR
Endorsed by leading Engine Builders. The only Sight Feed Lubricator that will feed beeswax successfully. An advantage which users and builders of Ice Machines will appreciate. Manufactured under strong patents, the validity of which is acknowledged.
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26x26 and 28x28, 30x30, with bed from 6 to 14 ft. long. Address all correspondence to
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Castings
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All sizes and kinds, with and without Axles.
Chilled Faced R. R. Frogs
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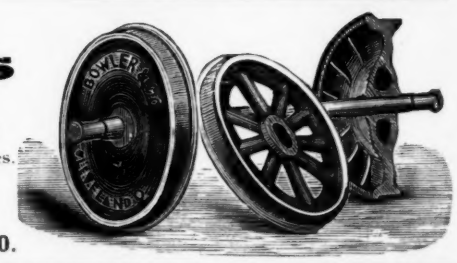
Nos. 9, 11 and 13 Winter Street. } BOWLER & CO.



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SYKES' IMPROVED
Best Roof in the World. Suitable for all classes of Buildings. Easy Put On.

All my Iron is Re-Rolled and Box Annealed, well Painted on both sides with Best of Paint and Pure Linseed Oil.
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Send for Circular and Price List, and mention this Paper.

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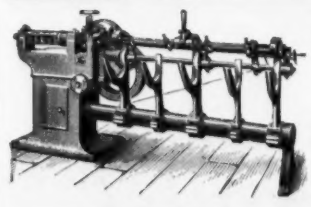
STEAM BOILERS,
Blast Furnaces, Tanks, Stacks, Stills, Agitators, Car Tanks, Etc.,
REEVES BROS., Props.,
Correspondence solicited. NILES, Trumbull County, O.



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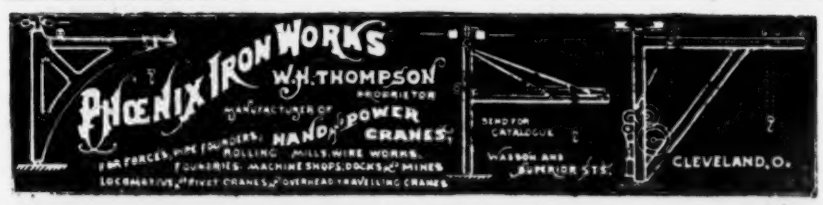
To Accurate Lengths Direct from the Coil.
Also Machinery for Hardware and other Manufacturing.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Augers and Bits.

Common augers and bits.....dis 70
Nell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ₱ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ₱ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $2 75@3 25
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....₱dox. $6 00@6 50
Others.....₱doz. $5 50@5 75
Full polished.....$8 00

Bolts.

Cast iron barrel bolts.....dis 70@70&10
Cast iron shutter bolts, etc.....dis 70@70&10
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70@70&10
Wrought iron square bolts.....dis 70@70&10
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 75&10
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 62½
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 70@70&10
Cast brass, loose joint.....dis 33⅓&10
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60&5
Fast joint, broad.....dis 55&10&5@60&10
Loose joint.....dis 70&10@75
Loose joint, jap.....dis 70&10@75
Loose joint, jap. with acorns.....dis 70&10@75
Loose pin, acorns.....dis 70&10@75
Loose pin, japanned acorns.....dis 70&10@75
Loose pin, acorns, jap. plated tips..dis 70&10@75
Wrought steel—
Wrought, fast joint, narrow.....dis 70&10@75
Wrought, fast joint, broad.....dis 70&10@75
Wrought, loose joint, broad.....dis 70&10@75
Table Butts, back flaps, etc.....dis 70&10@75
Regular inside blind.....dis 70&10@75
Light inside blind.....dis 70&10@75
Loose pin.....dis 70&10@75
Light loose pin.....dis 70&10@75

Chains.

Trace, 6½-10-2.....₱ pair 1.03)
Trace, 6½-10-3.....₱ pair .92) 50&10@50&10&5
Trace, 7-10-2.....₱ pair 1.11)
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887..dis 50&10&5@60
Galvanized Pump Chain.....₱ lb5½@6
Jack Chain, Iron.....dis 75@75&5
Jack Chain, Brass.....dis 70@70&5

Chisels.

Socket Framing and Firmer.....dis 75&5@75&10
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....₱ gross $12, dis 25@25&5

Hangers.

Barn door, old patterns.....dis 10&10@70
Climax, (Anti-Friction).....dis 70
Star.....dis 40&10@40&10&5
Scranton.....dis 40
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 40&10
Richard's.....dis 30@30&10

Horse Nails.

No.	10	9	8	7	6	
Ausable, ₱ lb.	23	24	25	26	28	dis 25&10@25&10&10
Putnam, ₱ lb.	18	19	20	21	23	dis 15
Essex						dis 25&10@25&10&10

Horse Shoes.

Burden, at factory.....₱ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....₱ keg $4 00
Mule Shoes, at factory.....₱ keg $5 00

Knobs.

Carriage, japanned.....₱ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hemacite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbear, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60
Escutcheons and keys.....dis 60
Padlocks and padlock keys.....dis 66⅔
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 66⅔
Letter box plates, genuine bronze...dis 60&10
Barn door locks.....dis 33⅓

Plumbs and Levels.

Standard list.....dis 70&10@70&10&10
Pocket levels.....dis 70&10@70&10&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers.dis 60&10@60&10&10
Pitcher spout, cheaper goods dis 70&5@70&10&5

Rakes.

Cast steel.....dis 65
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@$....dis 10
Rifle razor.....dis $9 50 net

Scales.

Hatch, Counter, No. 171.....₱ doz $21 00
Hatch, Tea, No. 161.....₱ dox $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....₱ doz $18 dis 25

Squares.

Steel and iron.....
Nickel plated.....} dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

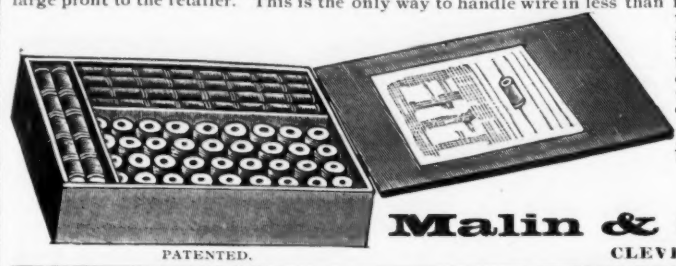
New List, January 2, 1888.

American iron carpet tacks all kinds.....dis 80@80&5
Steel carpet tacks all kinds.....dis 80@80&5
Swedes iron carpet tacks, all kinds.....dis 80@80&5
Swedes iron tacks.....dis 75&5@75&10
Swedes iron Upholsterers' tacks.....dis 75&10@75&10&5
Tinned Swedes iron tacks..dis 75&10@75&10&5
Tinned Swedes iron Upholsterers' tacks.....dis 75&10@75&10&5
American iron cut tacks.....dis 75@75&10
Copper tacks.....dis 50&10
Copper finishing and trunk nails.....dis 50&10
Cigar box nails.....dis 50&10@50&10&5
Finishing nails.....dis 70&10@70&10&10
Hungarian nails and miners' tacks.....dis 70&10@70&10&10
Gimp and lace tacks.....dis 75&10@75&10&5
" " " tinned.dis 75&10@75&10&5
Trunk and clout nails.....dis 70&10@70&10&10
Tinned trunk&clout nails.dis 70&10@70&10&10
Basket nails.....dis 70&10@70&10&10
Chair nails.....dis 70&10@70&10&10
Common and patent brads.dis 70&10@70&10&10
Tinned capped trunk n'ls..dis 70&10@70&10&10

Retail Dealers' Stock of Spooled Wire

In Painted Wooden Box with Hinged Cover.

This assortment contains over 140 Spools of Black and Tinned Annealed Steel, Copper and Brass Wire, and Comprises almost every size likely to be called for. It has been put up by us especially to meet the demands of the Retail Hardware Trade, and it covers all of the most salable sizes without any dead stock. It will readily bring over $10 00 at retail and represents a large profit to the retailer. This is the only way to handle wire in less than full bundles, as it will not rust, tangle or tarnish, and is convenient for both dealer and consumer. Write us for a net price on the whole assortment, or order it from your jobber.



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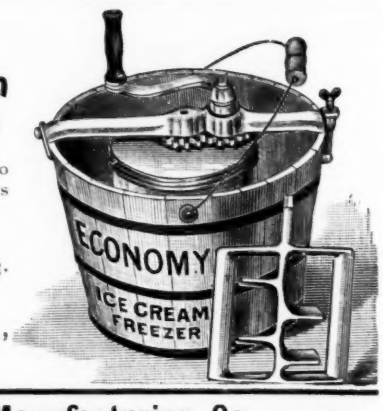

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Specially adapted for A No. 1 Boiler Plates, Boiler Rivets, Wire Rods, Stay Bolts, Stamping Ware, Nail Plates, etc. Will contract to completely erect, equip and place in operation blast furnaces, Whitwell stoves and steel plants as above. As I manufacture at my own works, everything appertaining to blast furnace and steel works construction I can guarantee promptness and satisfaction.

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LATEST IMPROVED FOLDED LOCK SEAM
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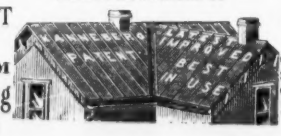

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Crimped Edge Iron Roofing and Siding, Beaded Iron Siding and Ceiling, Water Proof Building Paper, Ready-Mixed Paints, Etc.

WRITE FOR CATALOGUE, PRICE LIST AND SAMPLES.

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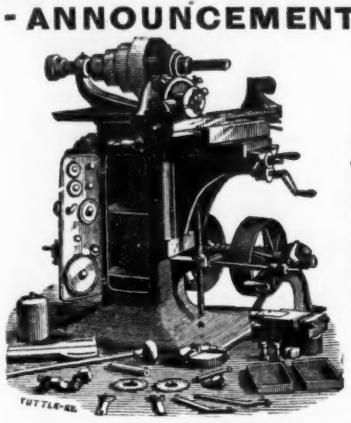

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We have the pleasure of notifying our customers and friends that we have secured a long lease of the new building at Laight and Canal sts., and shall take possession about April 1.

Our new quarters contain about 45,000 square feet of floor room, and has light on three sides. We therefore shall have increased facilities for manufacturing and executing any orders that we may be favored with. Our plant will be a modern one, and all necessary tools for the proper and expeditious finishing of work will be introduced as fast as required.

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Manufactured by **S. E. Crawford,**
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Chain Pump Pipe Buckets, Common & Expansion, Wood Force Pumps; also dealer in Steel Chain-best quality. Special inducements to parties ordering car lots. **Correspondence Solicited.**

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STRONG, WELL BUILT, SERVICEABLE

STEAM ENGINES

12 to 80 HORSE POWER.

Adapted to HEAVY, CONTINUOUS WORK.
EVERY ENGINE TESTED UNDER FULL LOAD.
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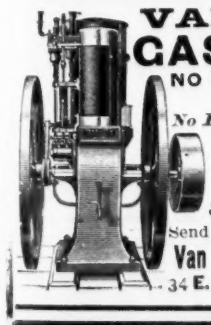

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No Extra WATER RENT or INSURANCE.
INSTANTLY STARTED.
DURABLE, RELIABLE, SAFE and ECONOMICAL.
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RADIAL DRILLING MACHINES
THREE DESIGNS, SIX SIZES.
EMBODY ALL DESIRABLE FEATURES
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Steam Jet Pumps,	-	**From $4.00 up.**
Automatic Injectors,	-	**" $5.00 up.**
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Write for Circulars, Etc.

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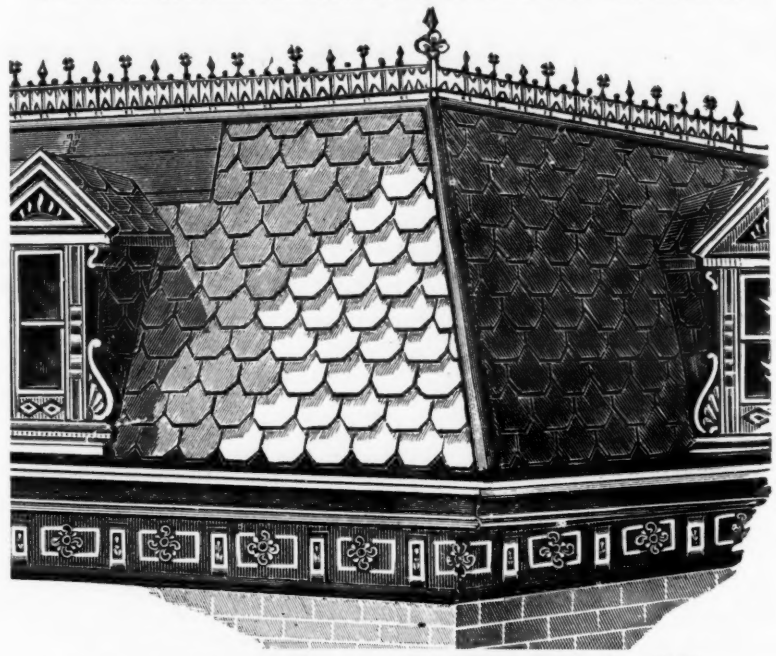
THE BEST ROOFING FOR CHURCHES, SCHOOLS AND RESIDENCES.



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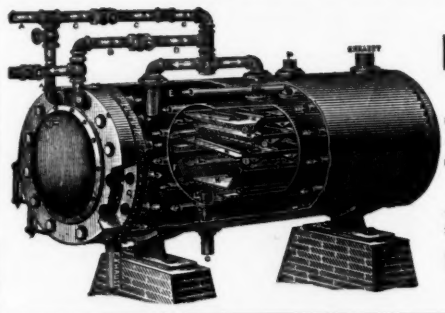
THE - ARMSTRONG - PURIFIER,

WITH

EXHAUST HEATER COMBINED.



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A full description of this heater, together with a valuable treatise on steam boilers, sent to any address, free of charge. Address,

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Radiant Facings and Blackings, Standard Core Compound, New Process Brass Moulding Sand.
☞ Illustrated catalogue and price list furnished on application. ☜

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Trade Mark Patented.

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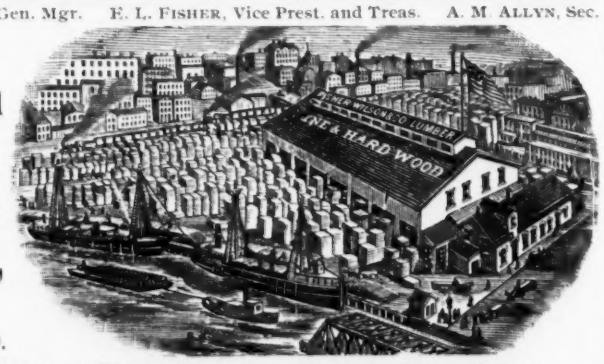

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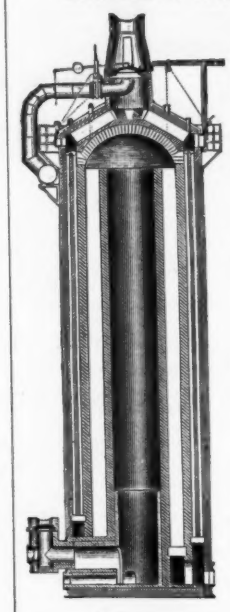

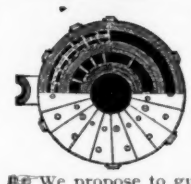

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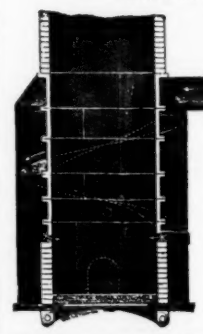

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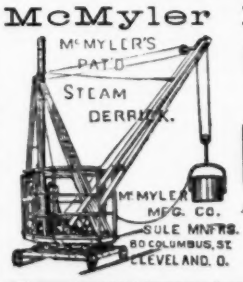

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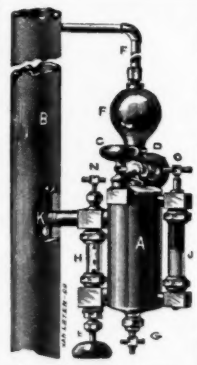

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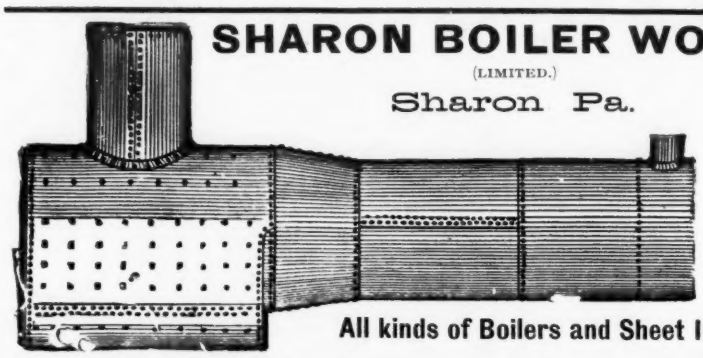

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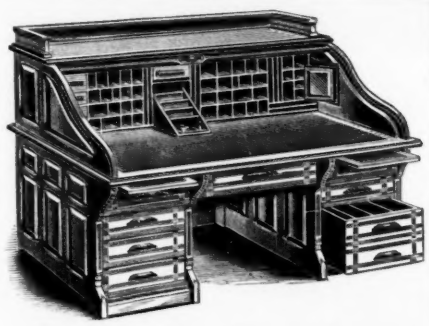

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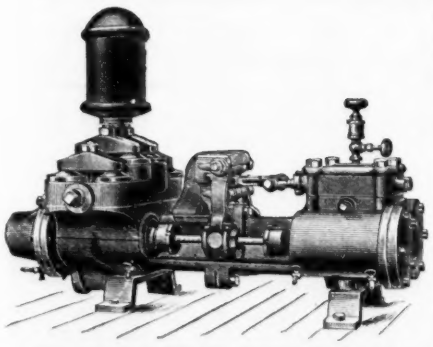

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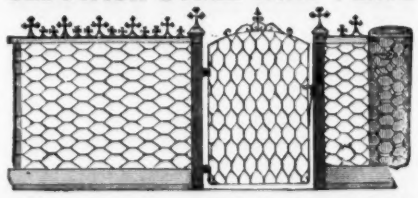

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Revised March 6th, 1888.

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Buffalo Passenger	10 40 a m	10 45 a m
Chicago Passenger	9 20 p m	.....
Local Freight	4 40 p m	7 30 a m
Westward.	**Arrive.**	**Depart.**
Chicago Passenger	.....	6.30 a m
Fostoria Passenger	5 06 p m	5 11 p m
Local Freight	1 00 p m	5 50 a m

Rocky River Accommodation departs 7:40 a. m.; 1:40 p. m.

Euclid Accommodation departs 6:24 a. m.; 5.05 p. m.

All trains daily, except Sunday.

Cleveland & Pittsburgh.

	Arrive.	Depart.
New York Express	12 50 p m	7 45 a m
New York Express	6 35 p m	1 35 p m
Alliance & Akron Accom	9 35 a m	3 25 p m
Ravenna Accommodation	8 25 a m	5 00 p m
Night Express	*5 25 a m	*1 10 p m

*Daily; all other trains daily, except Sunday.

Mt. Vernon & Pan Handle Route.

C., A. & C. Ry. Co.	Arrive.	Depart.
Akron, Col. & Cin. "Flyer"	5 40 p m	8 10 a m
Akron, Col. & Cin. Night Express	7 00 a m	8 00 a m
Akron, Col. & Zanesv'e Ex	12 50 p m	1 35 p m
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The 8 p. m. train runs daily. Elegant Pullman palace sleeping cars attached. All other trains daily, except Sunday.

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	Arrive.	Depart.
N. Y. & Pitts. Express	‡5 38 a m	*8 25 a m
Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommo		†6 40 a m
Pittsburgh Express	†6 25 p m	
Youngstown Local	†8 05 a m	
Mahon'g div. & Pitts Local		*11 40 a m
Mahoning Val. Accom		†4 30 p m
Pittsburgh Express	†1 20 p m	11 10 p m
New York Express	*8 00 p m	.....

*Daily. †Daily, except Sunday. ‡Daily except Monday.

Cleveland & Canton Railroad.

Depart—
Canton and Coshocton—7:30 a. m., 4:05 p. m.
Bedford—7:30 a. m., *9:00 a. m., 11:10 a. m., 2:00 p. m., 4:05 p. m., 5:45 p. m., *8:15 p. m.
Newburgh—6:10 a. m., 7:30 a. m., *9:00 a. m., 11:10 a. m., 2.00 p. m., 4:05 p. m., 5:45 p. m., *8:15 p. m.
Kent—7:30 a. m., *9:00 a. m., 4:05 p. m., *8:15 p. m.
Arrive from—
Canton and Coshocton—9:50 a. m., 6:25 p. m.
Bedford—6:00 a. m., *7:40 a. m., 9:50 a. m., 1:05 p. m., 4:15 p. m., 6:25 p. m., *7:15 p. m.
Newburgh—6:00 a. m., 7:10 a. m., *7:40 a. m., 9:50 a. m., 1.05 p. m., 4:15 p. m., 5:35 p. m., 6:25 p. m., *7:15 p. m.
Kent—*7:40 a. m., 9:50 a. m., 6:25 p. m., *7:15 p. m.

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Depot foot South Water Street.

	Depart.	Arrive.
Valley Junction Mail	*7 45 a m	*6 30 p m
Marietta Express	†11 15 a m	†2 30 p m
Valley Junction Express	*4 15 p m	*10 15 a m
Cleve. and Canton Express	*7 00 p m	†8 15 a m

*Daily. †Daily, except Sunday.

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No. 72, New York Express	* 8 30 a m
No. 72, Fast Pittsburgh Express	* 8 30 a m
No. 64, Fast Pittsburgh Express	* 3 00 p m
No. 66, Leavittsburgh Accommo	* 4 20 p m
No. 68, Pittsburgh Express	†10 50 p m
No. 68, New York Express	†10 50 p m
No. 70, Pittsburgh Local Express	†11 45 a m
No. 74, Youngstown Express	† 4 20 p m
	Arrive.
No. 65, Fast New York Express	*12 50 a m
No. 61, Pittsburgh Express	* 7 35 a m
No. 67, Pittsburgh Express	†10 55 a m
No. 63, New York Express	* 6 50 p m
No. 63, Pittsburgh Express	* 6 50 p m
No. 69, Pittsburgh Local Express	† 9 10 p m
No. 13, Accommodation	† 5 25 p m

*Daily. †Daily, except Sunday.

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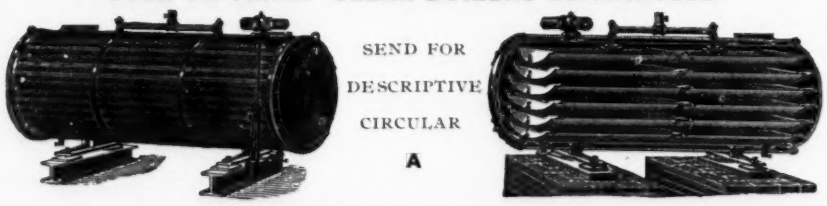

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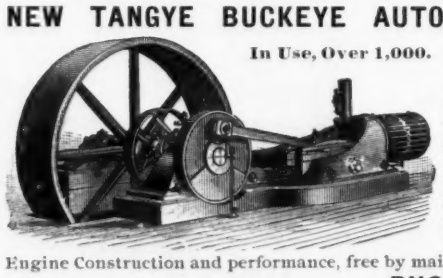

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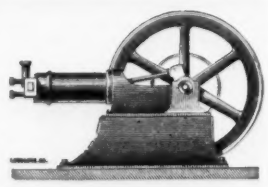

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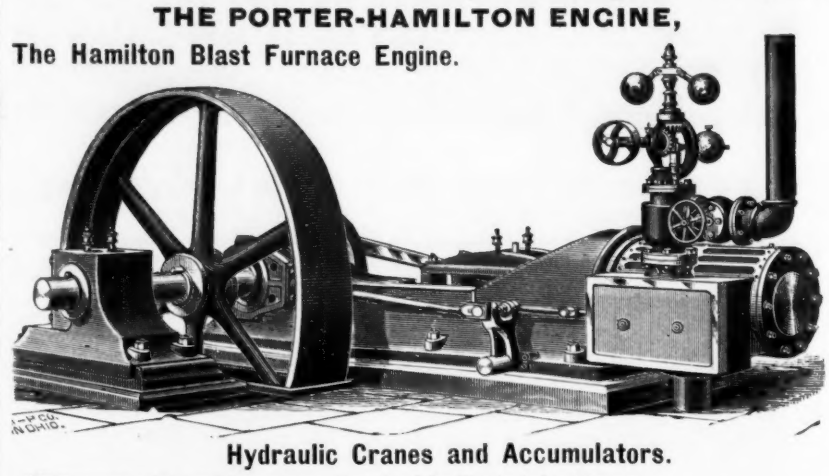

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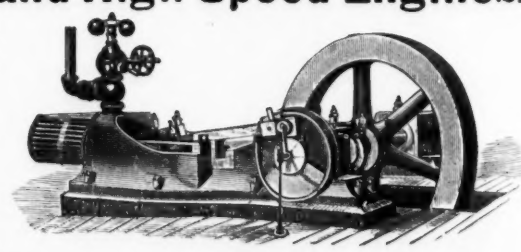

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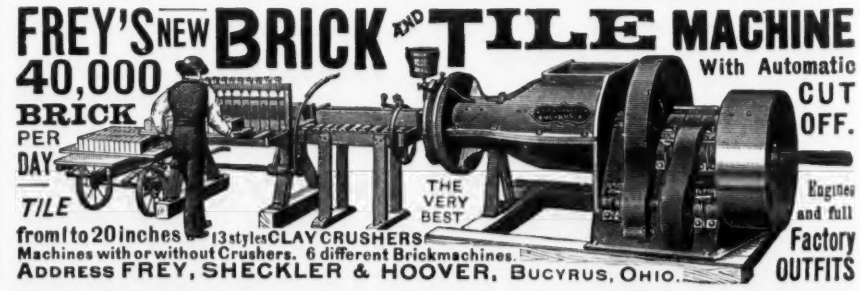

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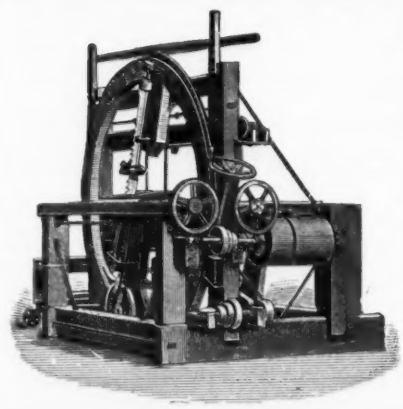

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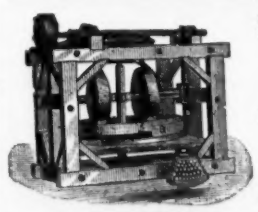

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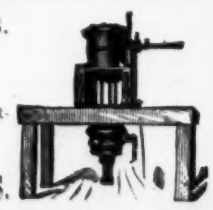

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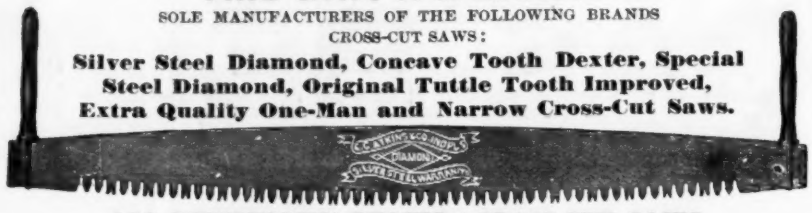

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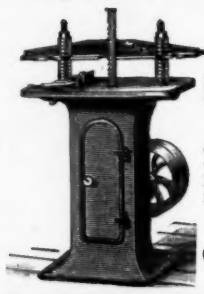

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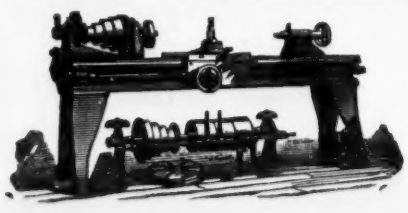

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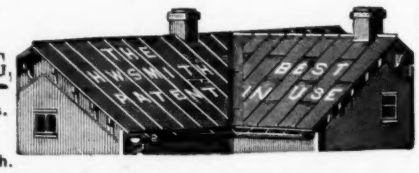

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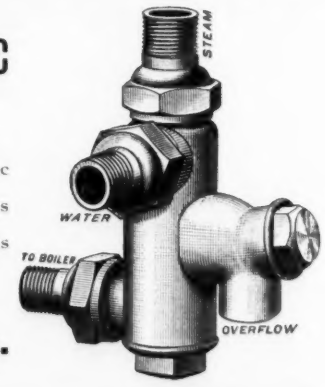

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